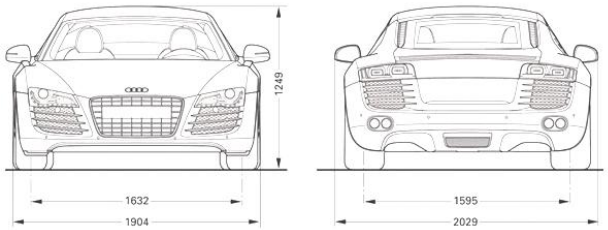


CATIA V5 Surface-modeling

(Tutorial 8- Rebuild Audi R8)

From Pictures

Not For Commercial Use

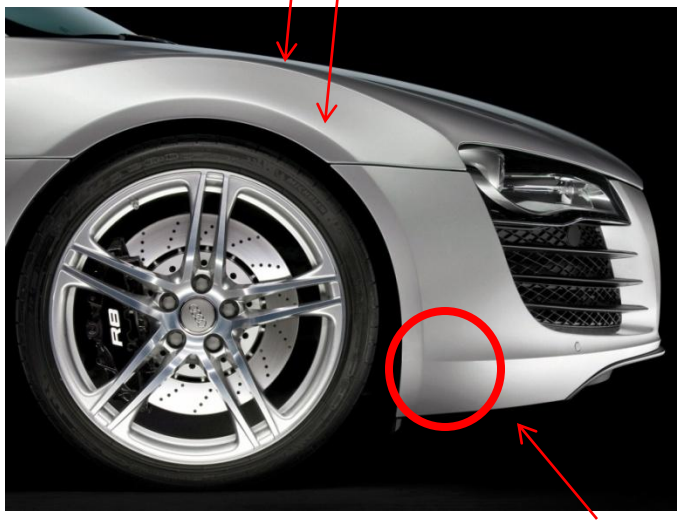
Surface-modeling

Design with a Master Model

Design in Context

Design Intent

Hard fillet



Hard fillet

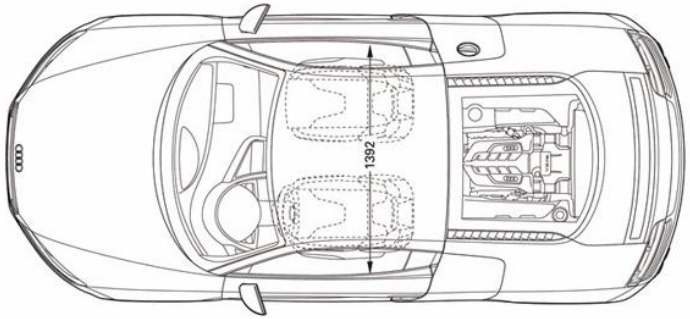
PictureSource: www.audi.com/r8

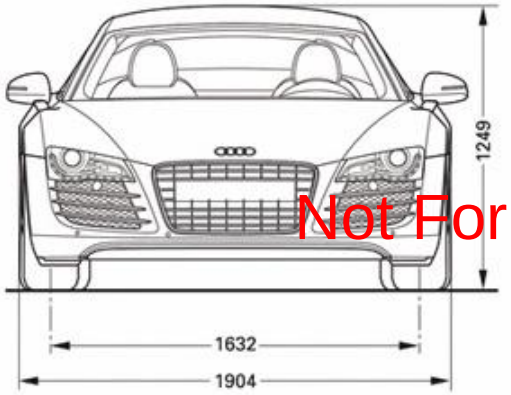
Fillet disappears soft fillet Hard fillet

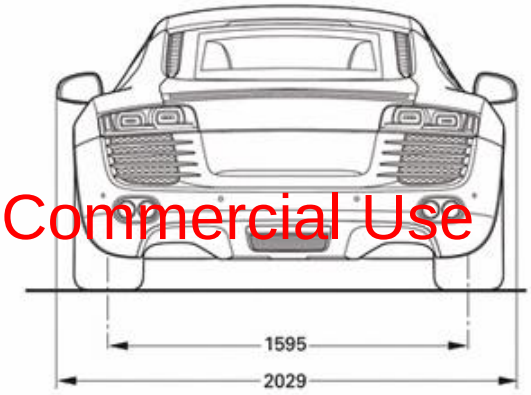
Fillet disappears

Grab photos from internet (in different views)

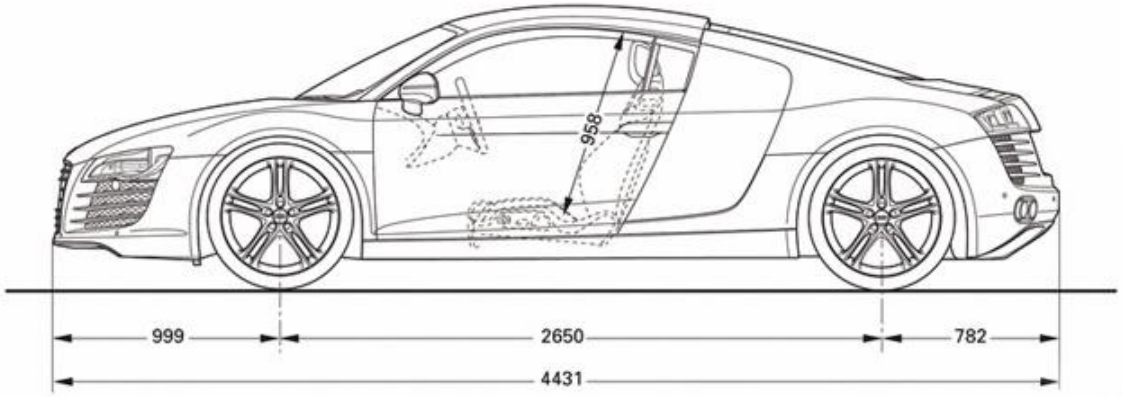
A- 2





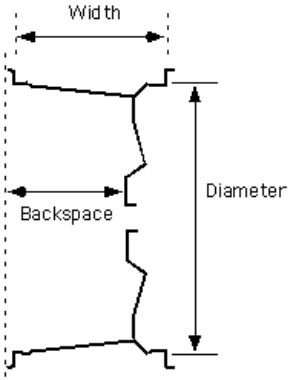


Not For Commercial Use



Wheelbase = 2650
Length = 4431
Width, Max w/o mirrors = 1904
Height = 1249
Tread Width, Front = 1632
Tread Width, Rear = 1595

Front Wheel Size (in) = 19 x 8.5
Rear Wheel Size (in) = 19x 11.0
Front Tire Size = P235/ 35R19
Rear Tire Size = P305 / 30R19



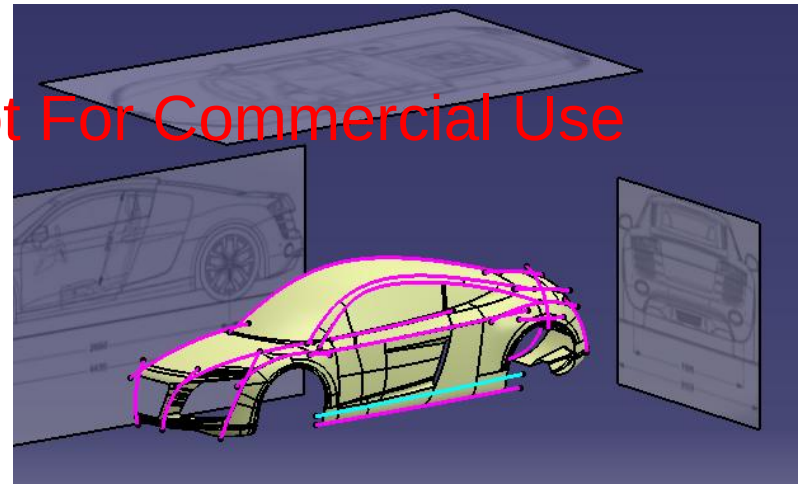
Non-Commercial Use

Surface-modeling

Design with a Master model

Tutorial 8A

- Insert 2d pictures and reposition them on offset planes
- Create 3D control curves



Not For Commercial Use

Tutorial 8B,C, D

- Create the front body of the master model
- Create the middle body of the master model
- Create the rear body of the master model
- Create parting surfaces

Tutorial 8E

- Split the finished (master) model into separate parts
- Build more details on each part

Tutorial 8F

- Reassemble them together

Please be reminded that this series of tutorials is designed to demonstrate a design approach with CATIA, rather than the command itself.

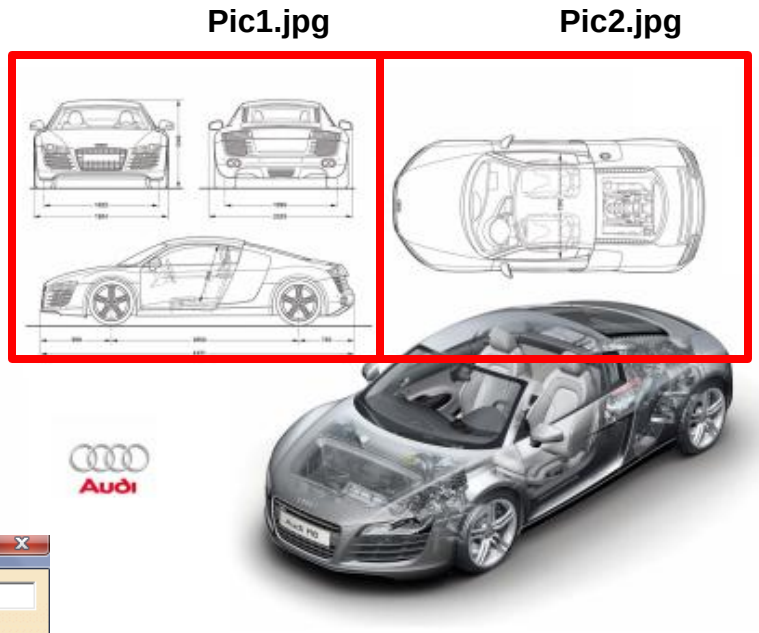
Tutorial 8A

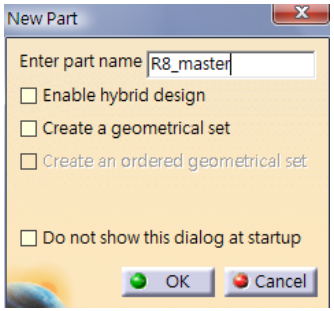
- Create a new project folder
  (e.g. C:\Car_R8)

Before Start:

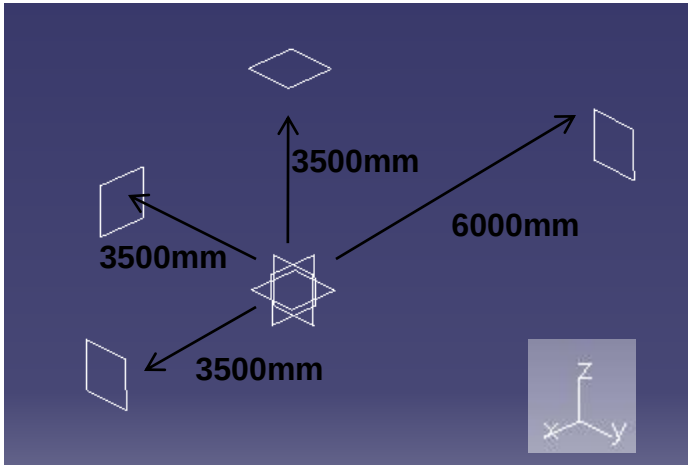
http://models.audiusa.com/r8

- Crop the picture (972.jpg) into two jpeg files in a square size (just extracting four views: front, left, top & back)
- Save the files into the project folder



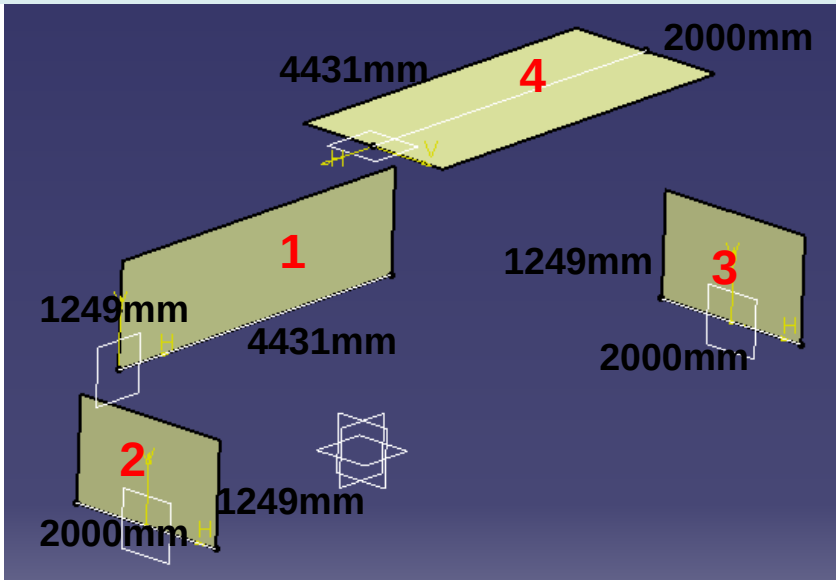


- Start CATIA
- File/New/ Part
- DO NOT SELECT “Hybrid Design”
- Switch Workbench to Generative Shape Design
- Insert a geometrical set “reference”
- Create 4 offset planes



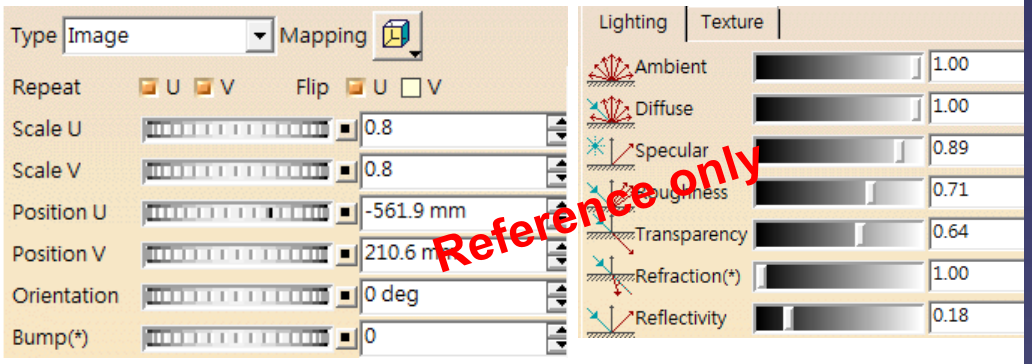
Tutorial 8A

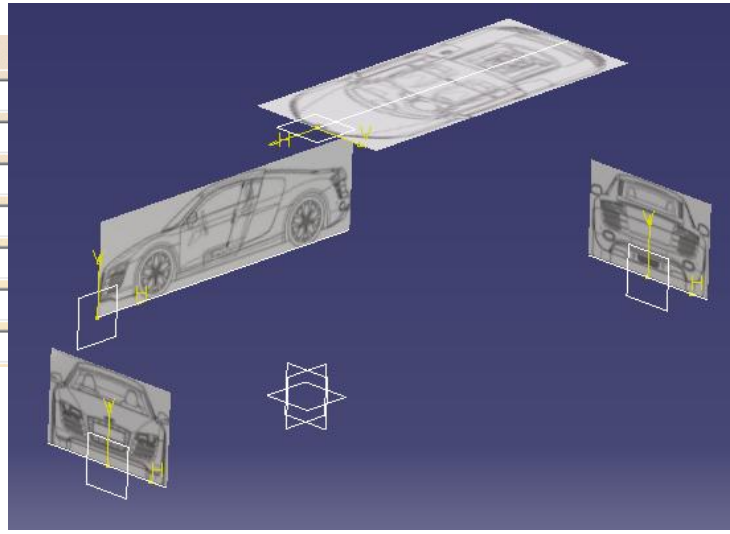
- Create 4 Extruded Surfaces on offset planes
- (4431mm x 1249mm , start from origin)
- (2000mm x 1249mm , symmetric)
- (2000mm x 1249mm , symmetric)
- (2000mm x 4431mm , start from origin)



- Apply any material onto each surface, then change the texture to our prepared jpeg files (pic1. jpg or pic2. jpg)

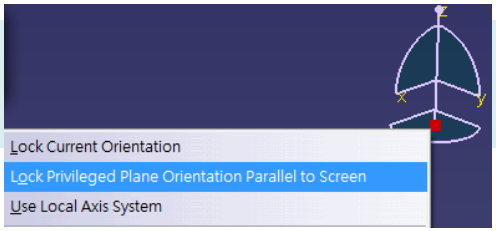
- Scale & Position the image to match the surface's size



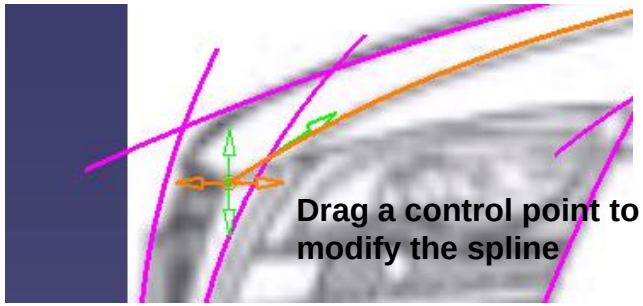


- Make them semi-transparent
- **Set the Geometrical set "Reference" to "Unpickable"**

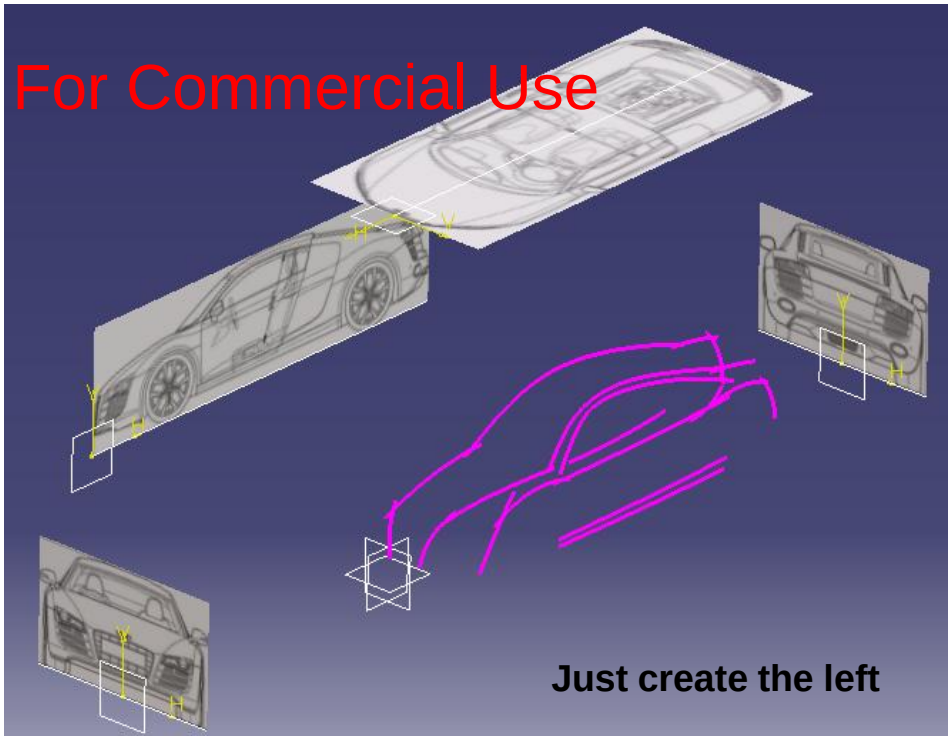
Tutorial 8A

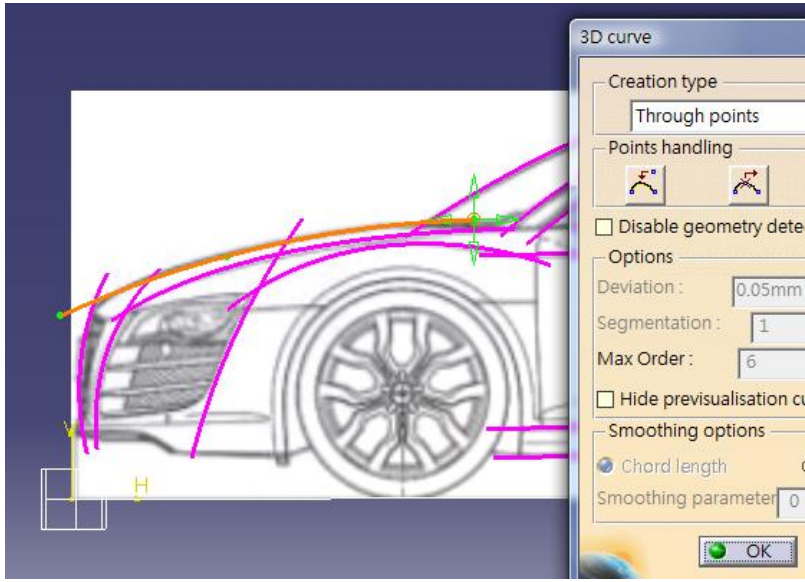


- Switch workbench to “Shape/ Freestyle”
- Insert a NEW geometrical set “control_curves”
- Set “Lock Privileged Plane Orientation Parallel to Screen” on compass
- Create some 3d curves (left side only)
- No curve blending or trimming
- Thicken the curves and change color to PINK



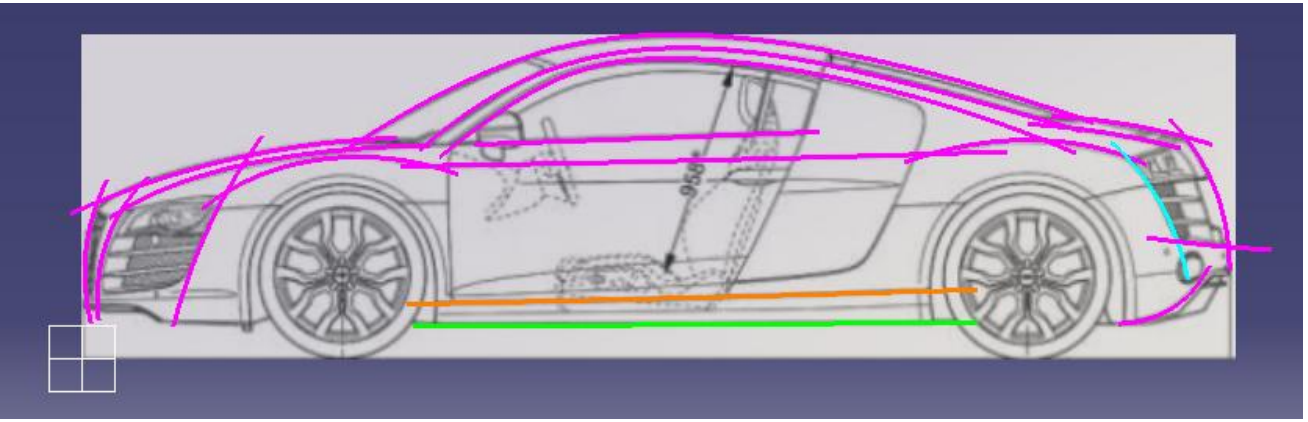
Not For Commercial Use

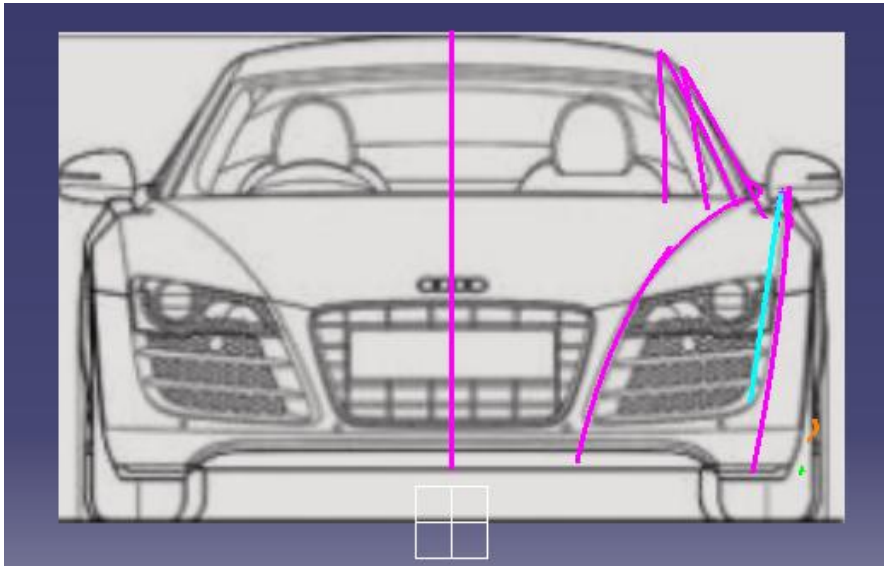




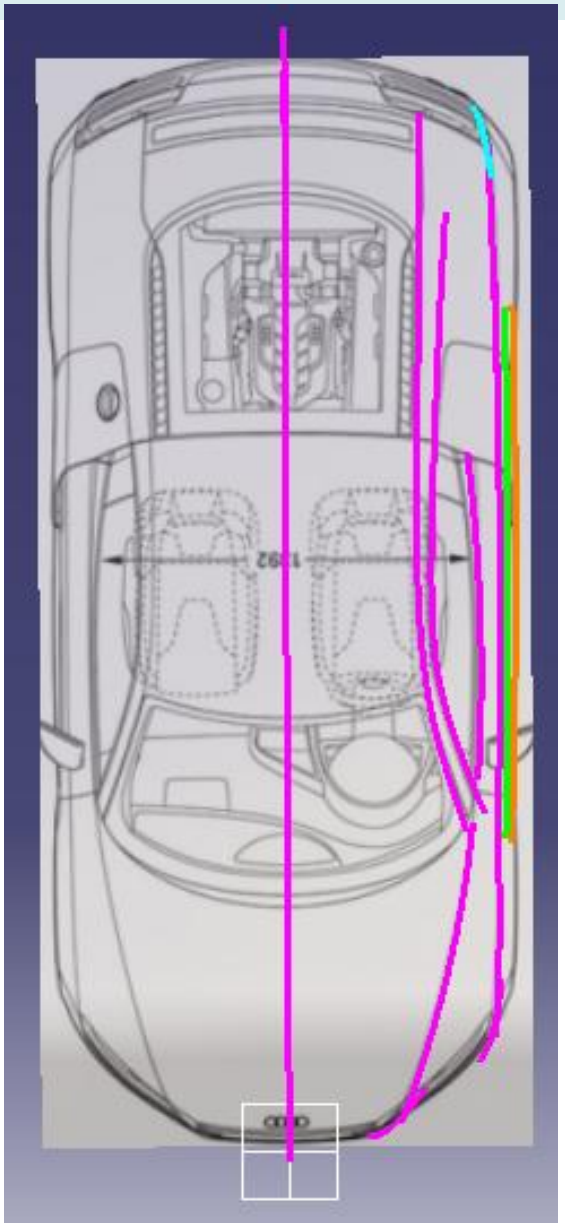
Use minimum number of control points to create a spline

Tutorial 8A





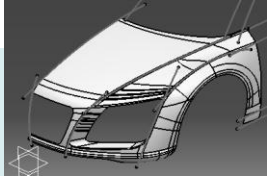
Total
19 curves



Non-Commercial Use

Front Body (master)

Tutorial 8B

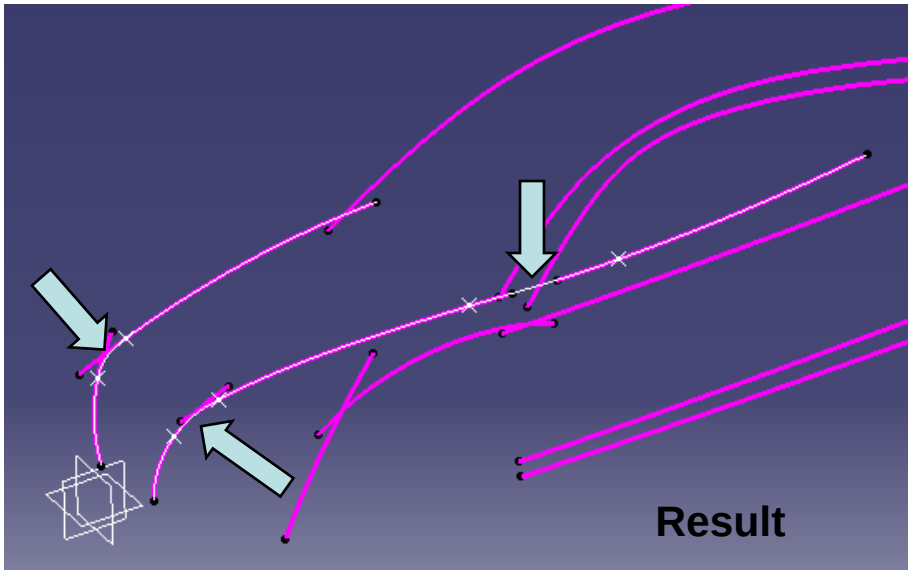


- Switch workbench to “Generative Shape Design”

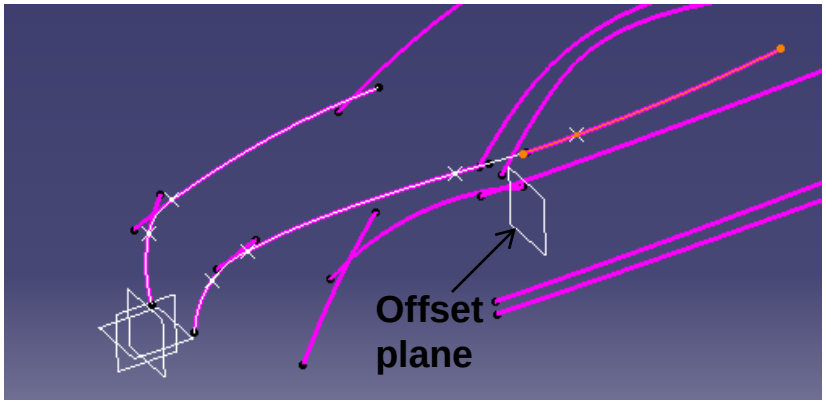
- **Insert a NEW geometrical set “Front_body”**

- Make a point on curve
- Make an point on the neighbor curve
- Connect curve (curvature continuous, trim elements)
- Adjust the points to get a smooth trimmed curve

- Complete the above steps to make two more trimmed curves (as shown)

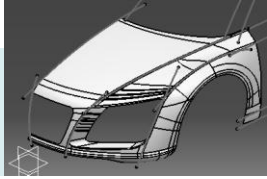


- Create an offset plane
  (Reference YZ plane, Offset 1495mm)
- Split the trimmed curve into two

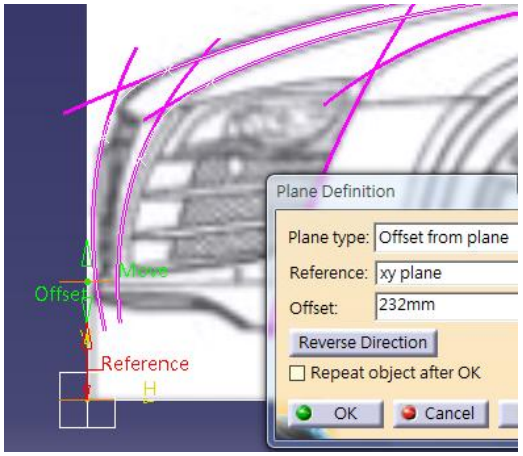


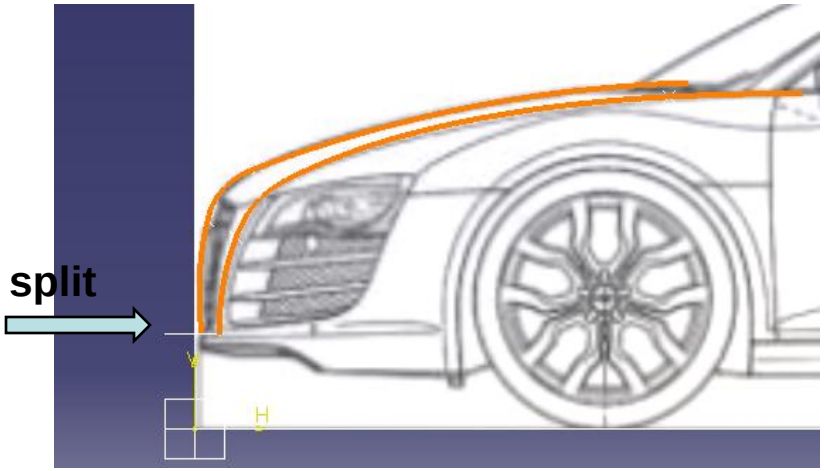
Front Body
(master)

Tutorial 8B

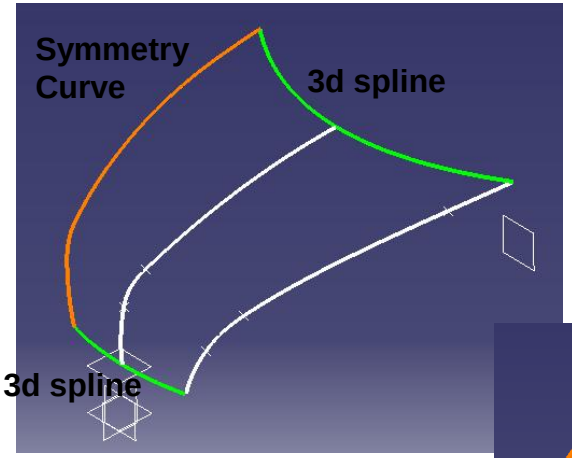


- Create an offset plane from the bottom (Reference xy plane, Offset 232mm)
- Split the curve by the plane (to remove the bottom portion)
- Split another curve (to remove the bottom portion)

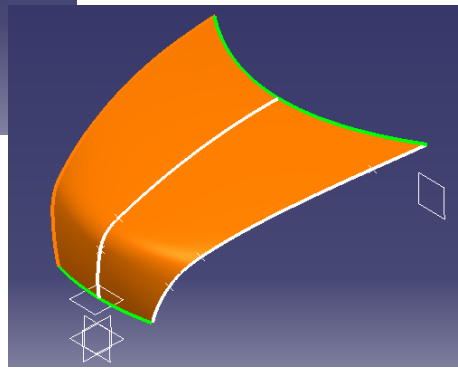




- Mirror the curve
- Create a 3d spline (linking 3 endpoints)
- Create another 3d spline

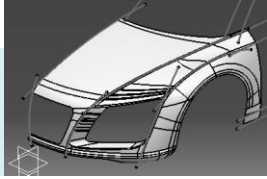


- Create a multi-sections surface



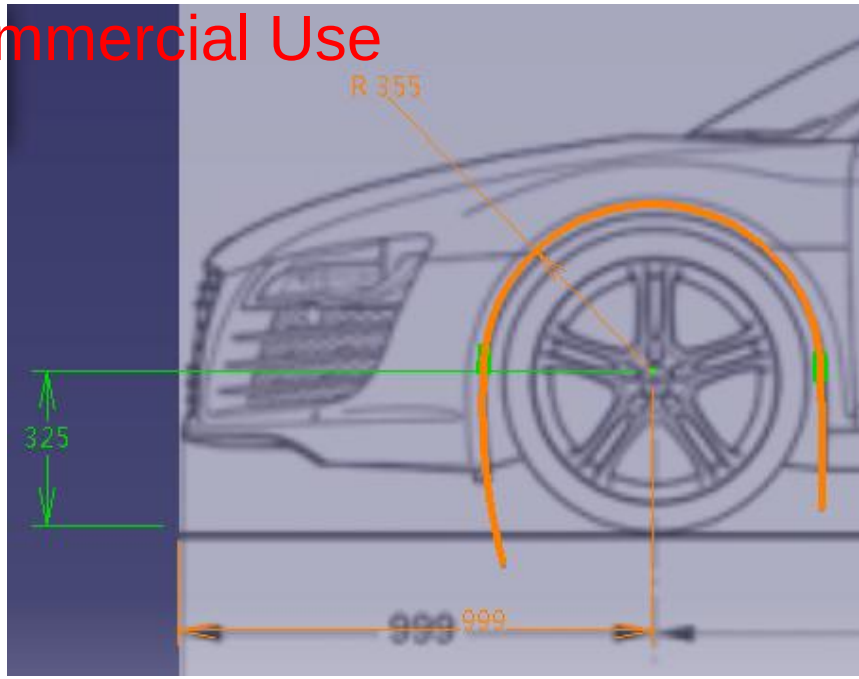
Front Body
(master)

Tutorial 8B

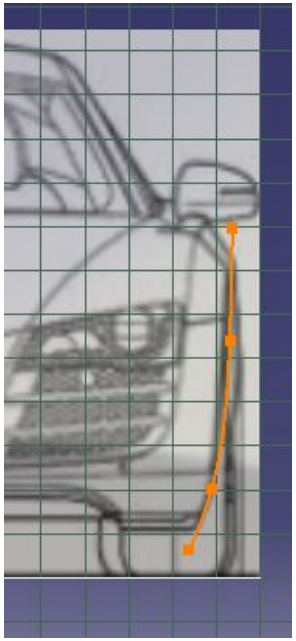


Not For Commercial Use

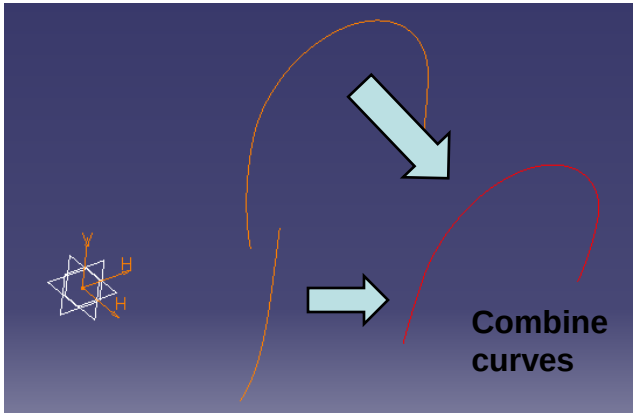
- Create a sketch
  (on XZ plane, right view)
  (three arcs, tangency continuous)

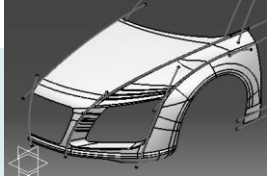


- Create another sketch (YZ plane, front view)
  - Draw a spline



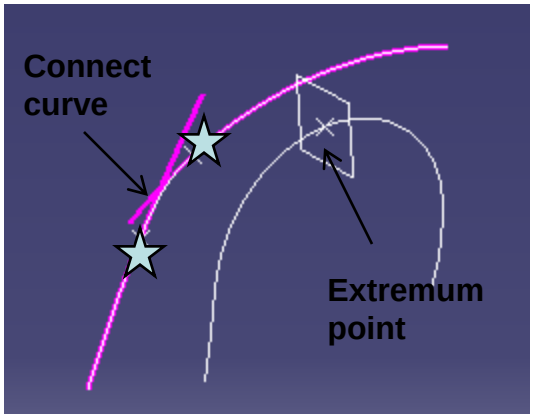
- Create a Combined curve





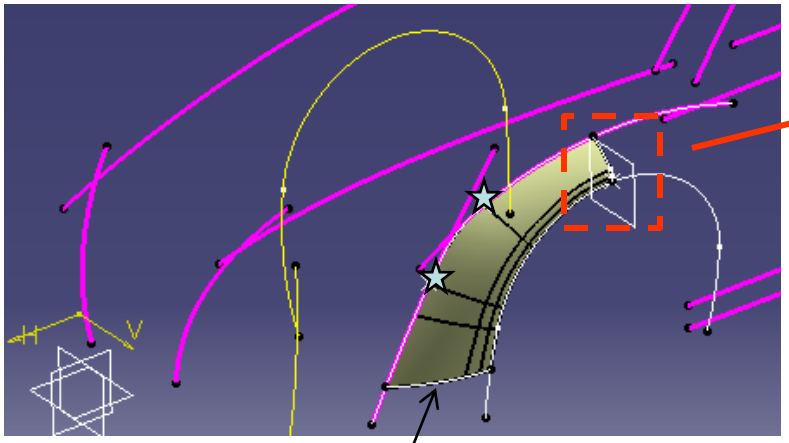
Tutorial 8B

- Create a Extremum Point on top of combined curve
- Create a plane
  (Reference: Yz plane, Point: Extremum point)

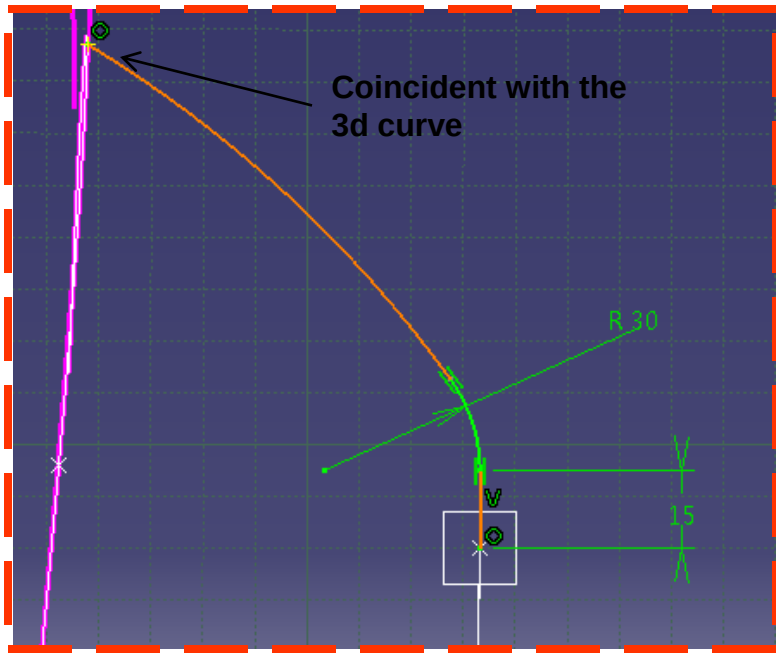


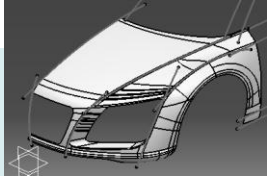
- Create a point on 3d curve ☆
- Create a point on 3d curve ☆
- Create a Connect curve (trim elements)

- Create a sketch on plane (a line, an arc, then fillet)
- Create another sketch on the offset plane (an arc)
- Create a multi-sections surface
  (Coupling Control (optional))



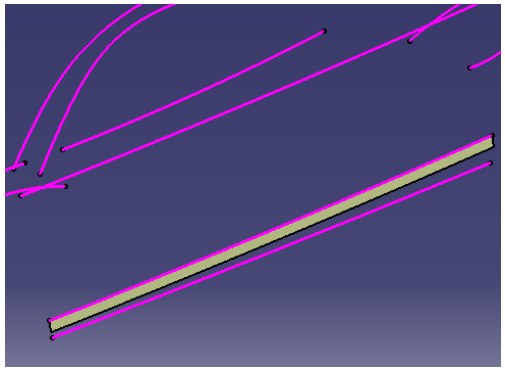
sketch



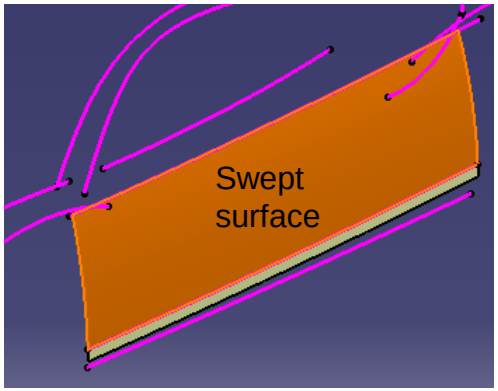


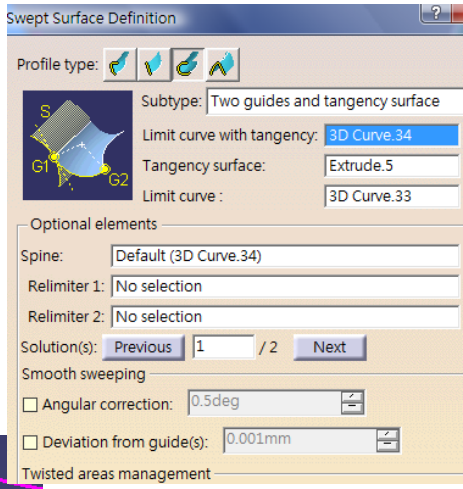
Tutorial 8B

- Create an extruded surface from a 3d curve (Direction: xy plane; dimension: 50mm)



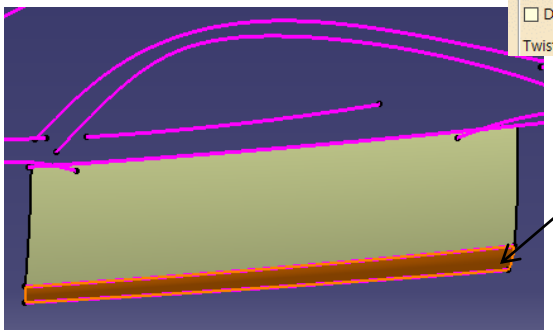
- Create a Swept surface
  - Profile type: Circle
  - Subtype: 2 guides and tangency surface

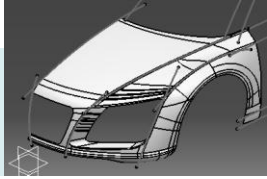




- Create a Blend Surface
  - Define first curve, first support, second curve
  - Select “Curvature Continuity” for first support

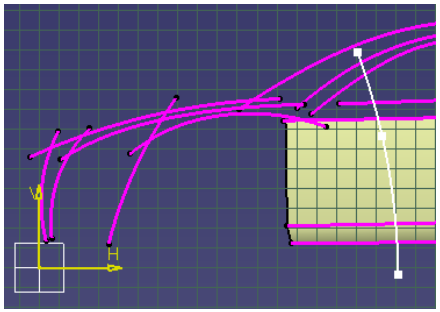
- Join the Swept surface & the Blend Surface

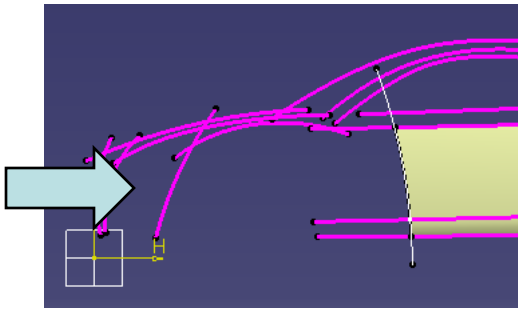




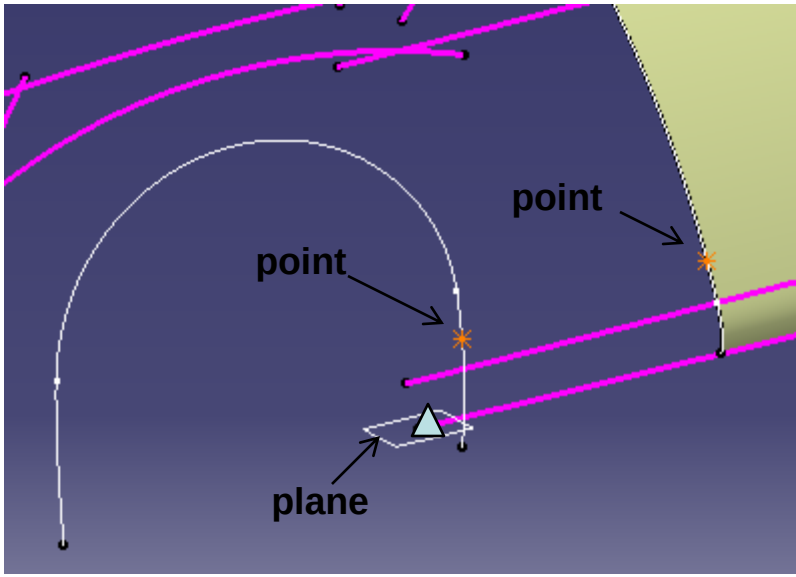
Tutorial 8B

- Create a sketch on XZ plane
- Project the sketch on the Join Surface (Direction: XZ plane)
- Split the surface by the projected curve

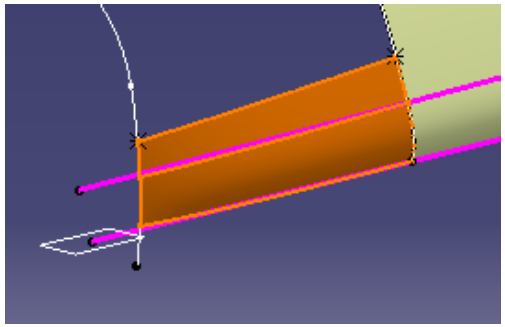


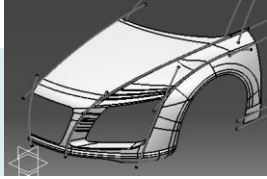


- Create an offset plane (Reference: Xy plane, Point: endpoint △)
- Create a point on the combined curve
- Create another point on the projected curve



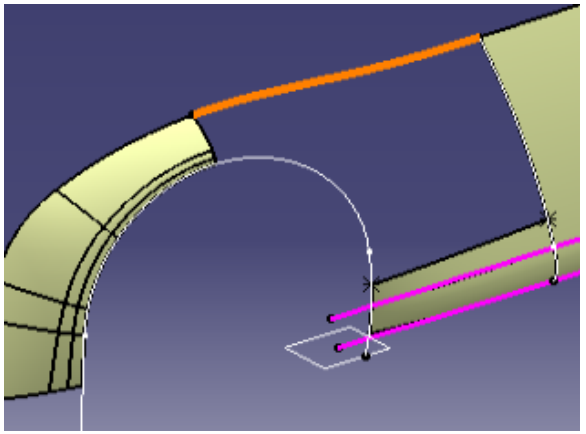
- Create two split curves
- Create a blend surface



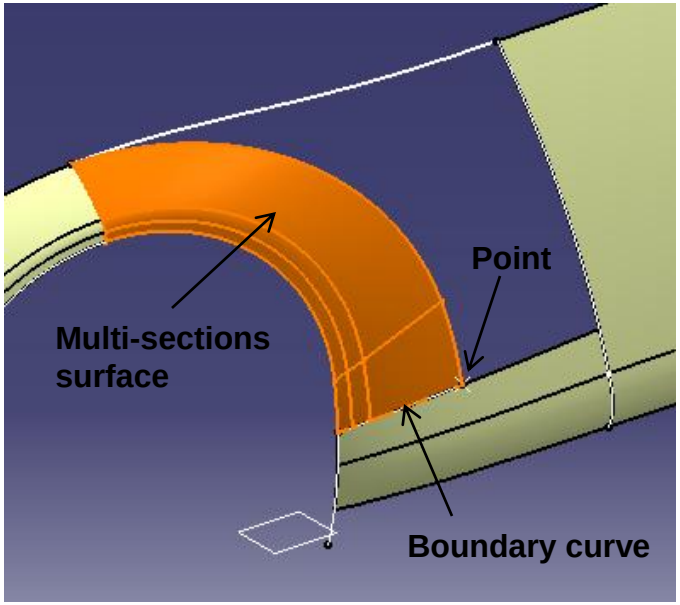


Tutorial 8B

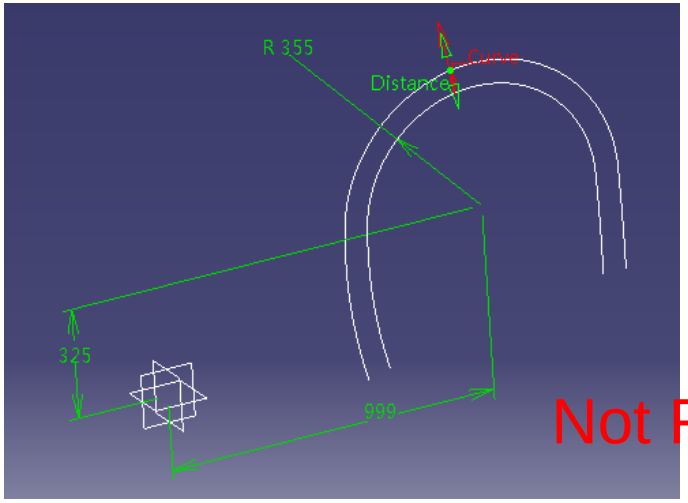
- Create a Connect curve (Curvature Continuous at both ends)



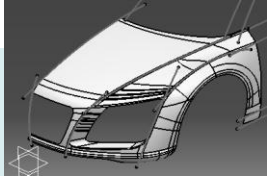
- Create a point on the edge
- Create a boundary curve
- Create a multi-sections surface (2 sections, 2 tangent faces, 1 guide)



- Create a Parallel Curve (offset 70mm, upward)

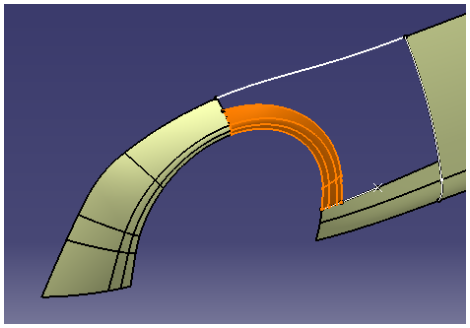


Not For Commercial Use

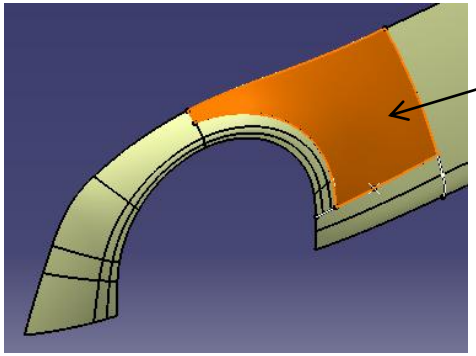


Tutorial 8B

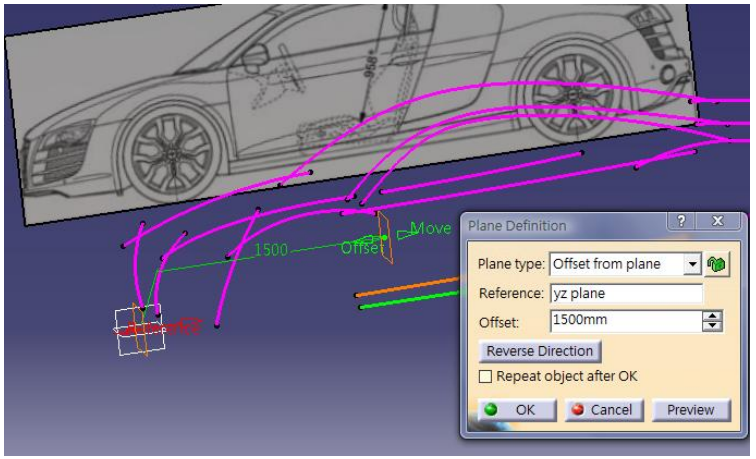
- Project the parallel curve on the multi-sections surface
- Split the surface by the projected curve



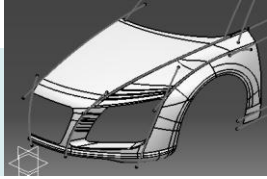
- Create a Fill Surface (Curvature continuous)
  (Check the resultant surface; if not smooth, modify the corresponding curves/sketches)



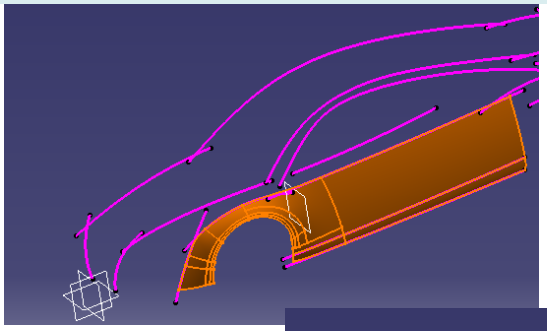
- Create an offset plane
  - Reference: Yz plane,
  - offset = 1500mm



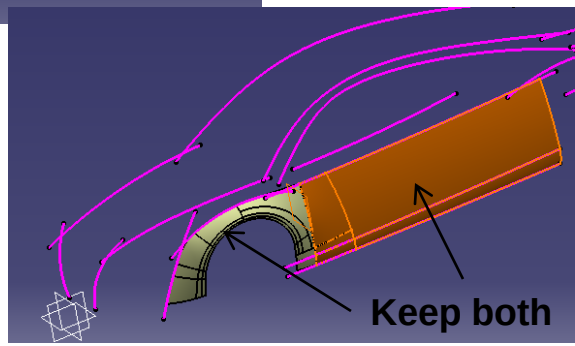
Tutorial 8B



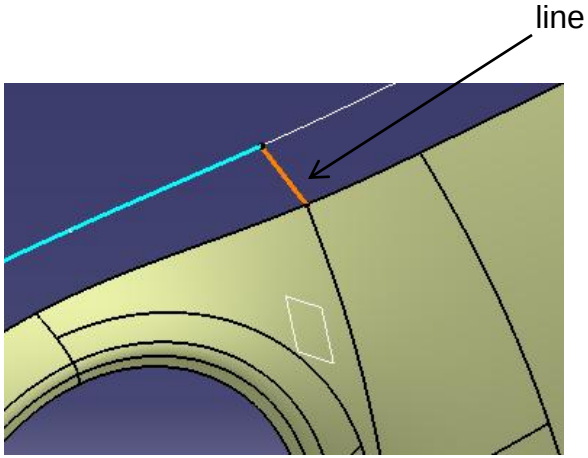
- Join surfaces

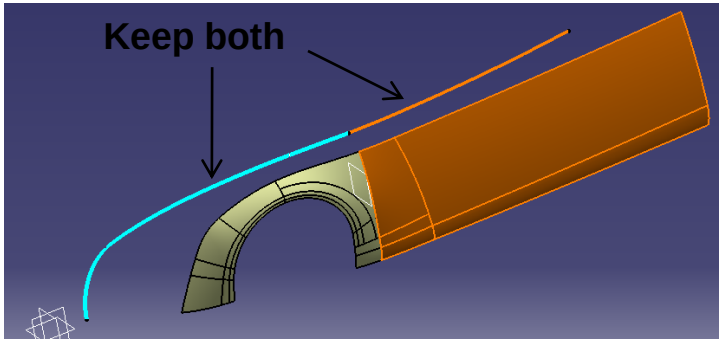


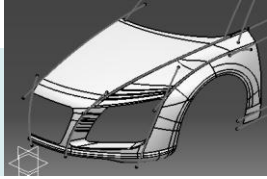
- Split the join surface into Two (by the offset plane) (Keep both sides)



- Split the resultant curve into Two (by the offset plane)
- Create a line (point – point)

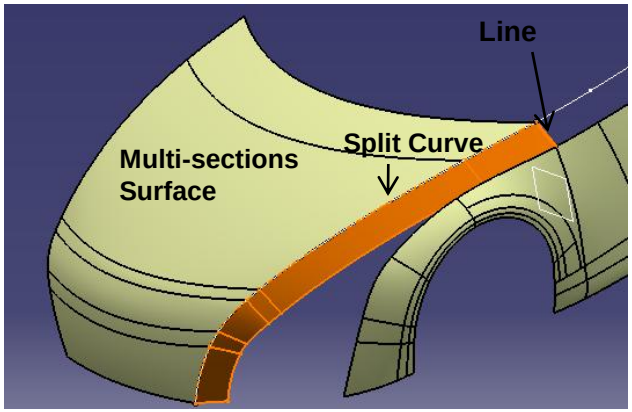




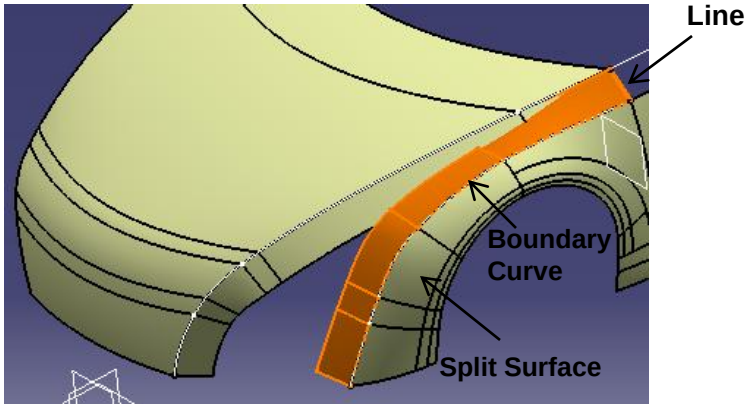


Tutorial 8B

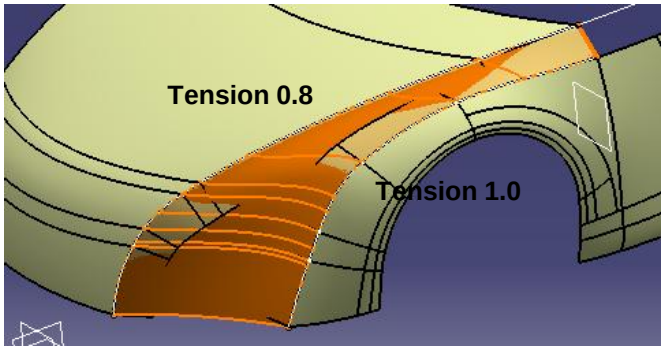
- Create a swept surface
  - Profile : Line
  - Guide Curve: Split Curve
  - Surface: Multi-sections Surface



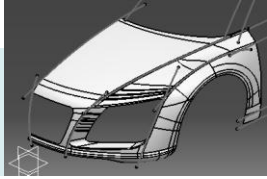
- Create a boundary curve
- Create a swept surface
  - Profile : Line
  - Guide Curve: Boundary Curve
  - Surface: Split Surface



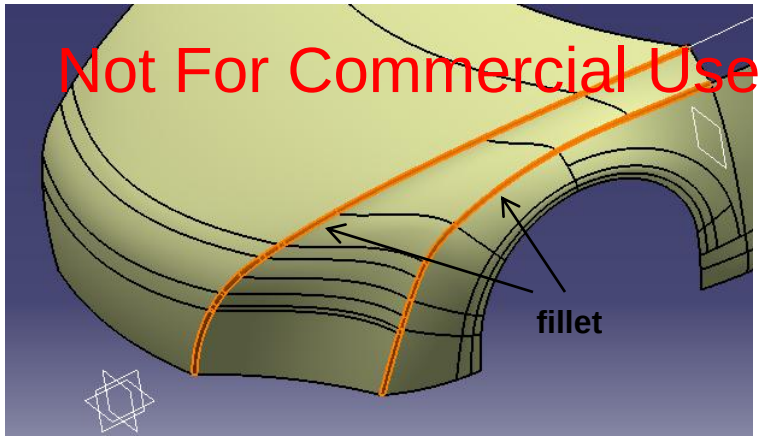
- Create a blend surface
  - tangent continuous on both sides
  - tension 0.8, 1.0



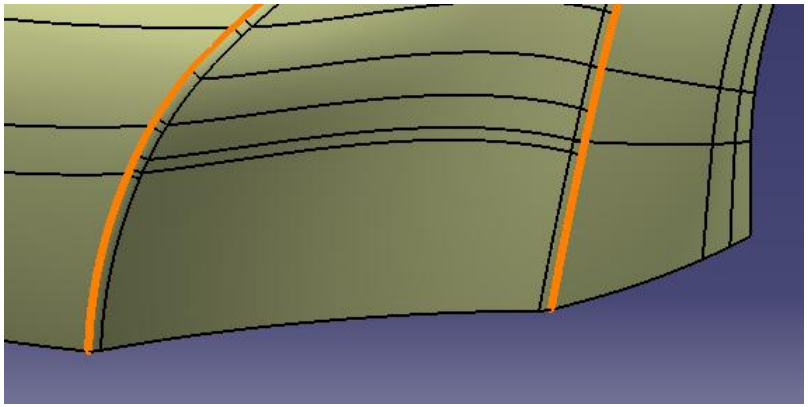
Tutorial 8B



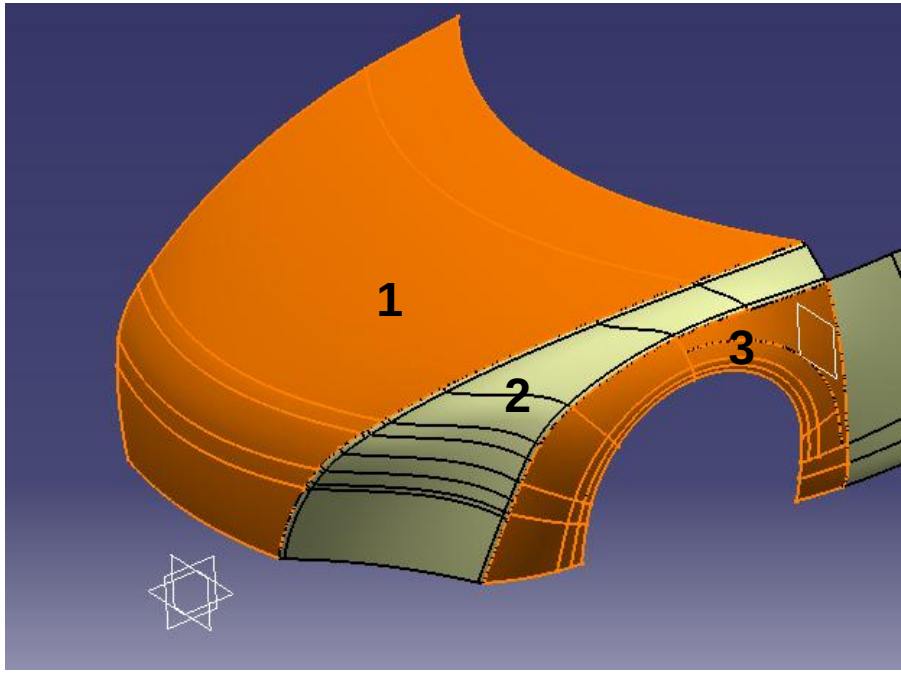
- Create surface-surface fillets (R25mm) twice

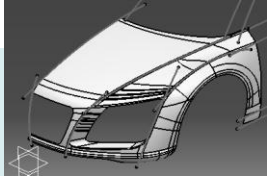


- **Extract** two edges (tangency continuity)



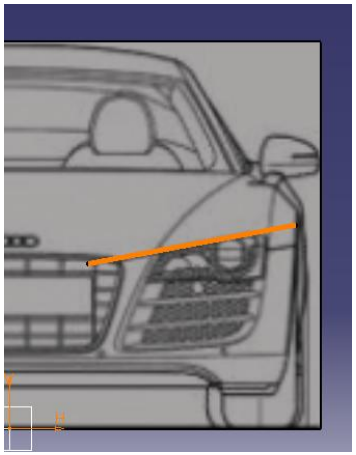
- Split the fillet surface into **THREE**



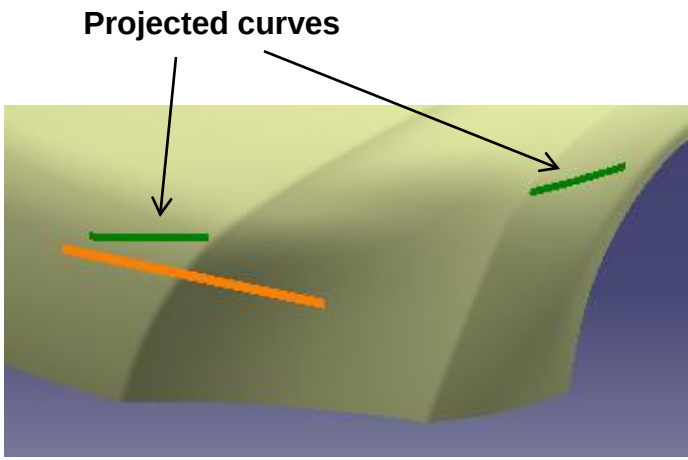


Tutorial 8B

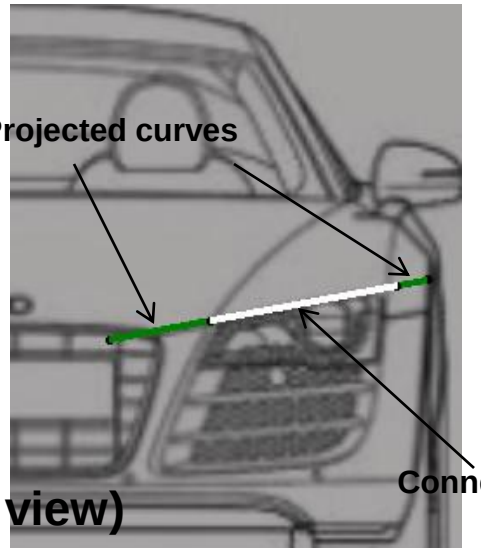
- Create a sketch (on Yz plane)
  - Draw a straight line



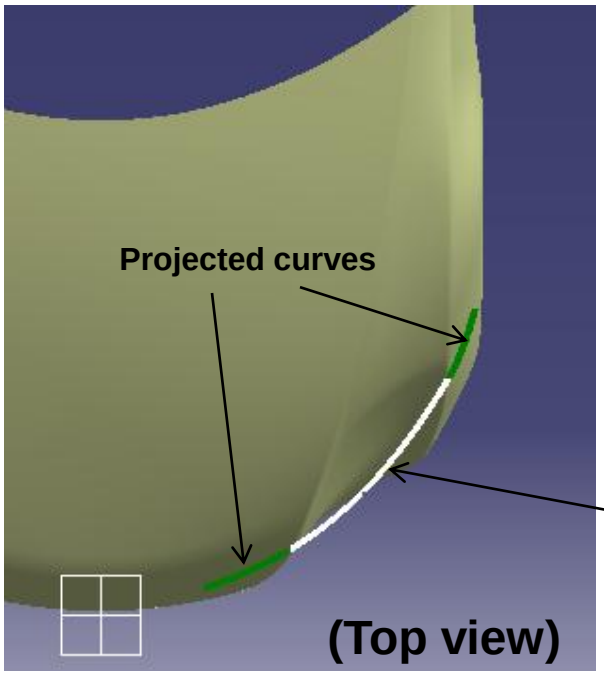
- Project the sketch onto the two split surfaces

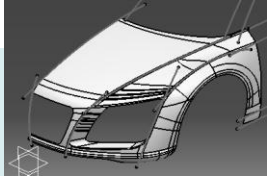


- Create a connect curve
  (Tangency Continuity on both ends)



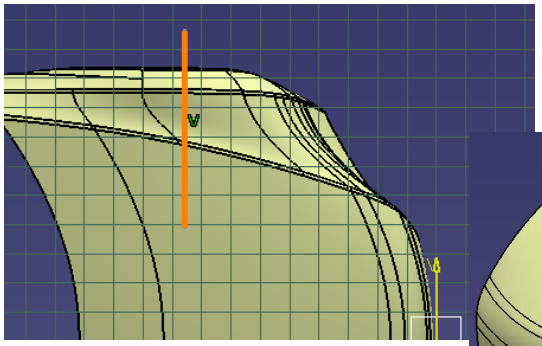
(Front view)



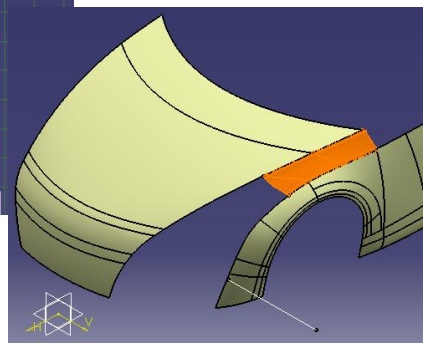


Tutorial 8B

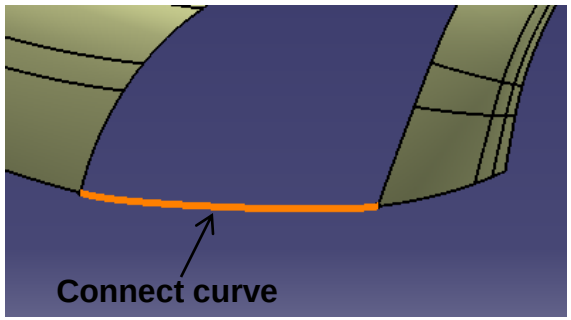
- Create a sketch (on Xy plane)
  - Draw a straight line



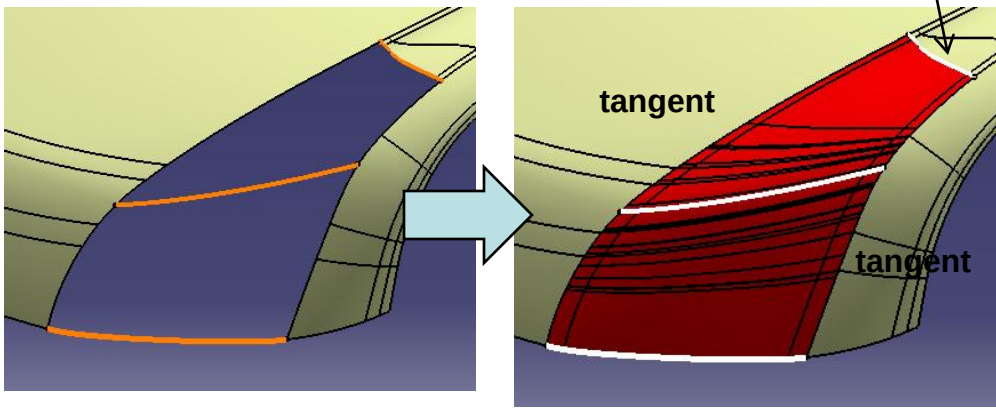
- Project the sketch onto the middle split surface
- Split the surface by the projected curve

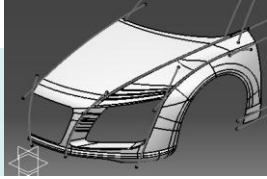


- Create a connect curve
  - Curvature Continuity at both ends
  - Tension 0.5 at both ends



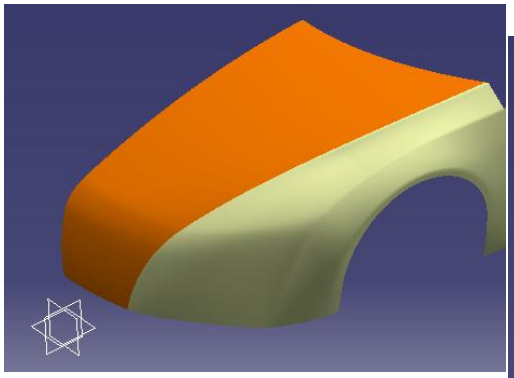
- Create a multi-sections surfaces
  - 3 sections & 2 guides
  - Tangent to surfaces



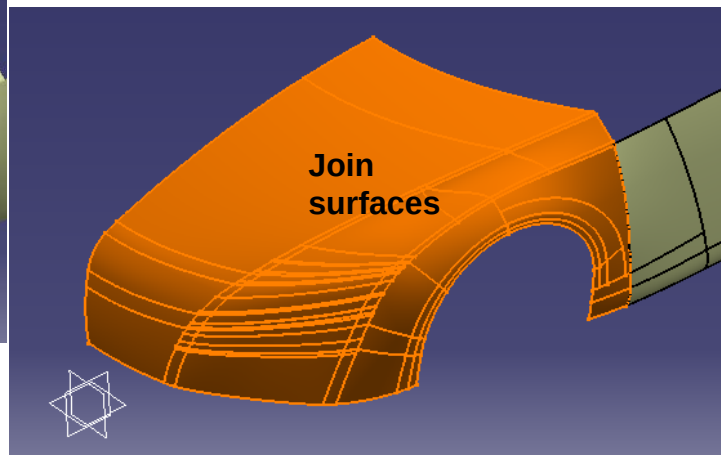


Tutorial 8B

- Split surface by XZ plane

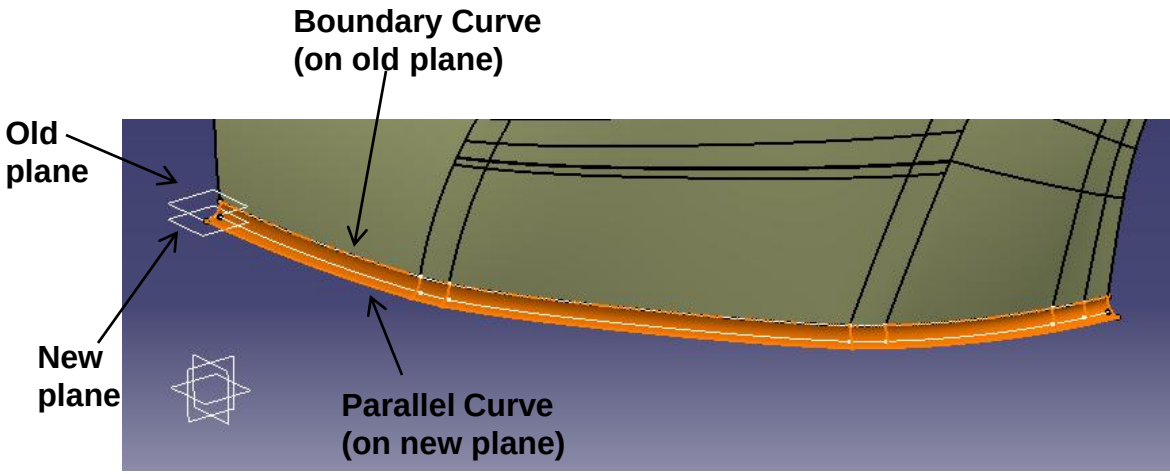


- Join surfaces

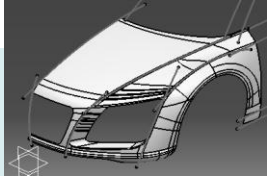


- Create a new plane (offset 20mm from the existing plane)
- Create a boundary curve
- Project it onto the offset plane
- Parallel curve by 20mm (outward)

- Create a blend surface

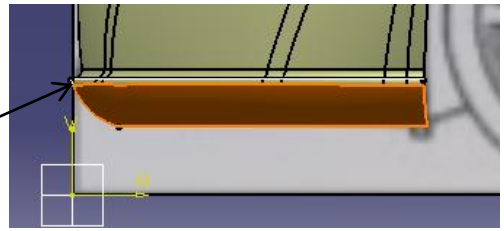


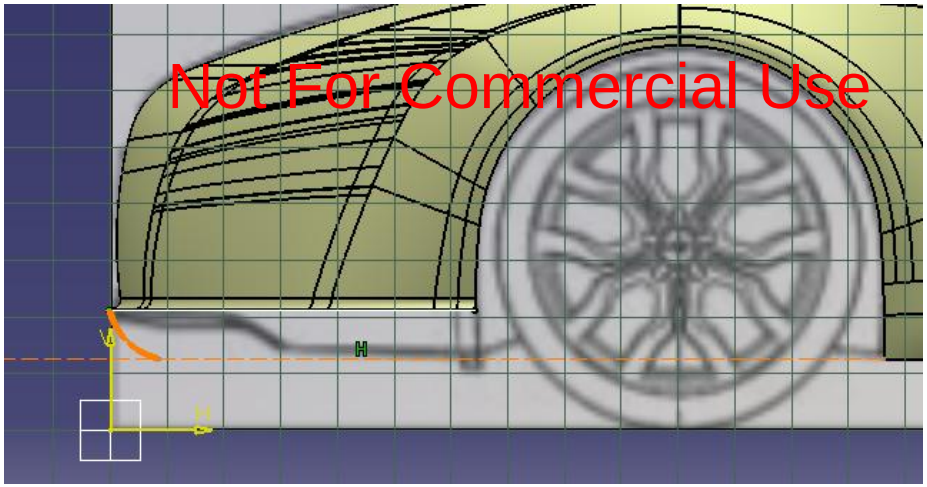
Tutorial 8B



- Create a sketch on XZ plane
  - Draw an arc

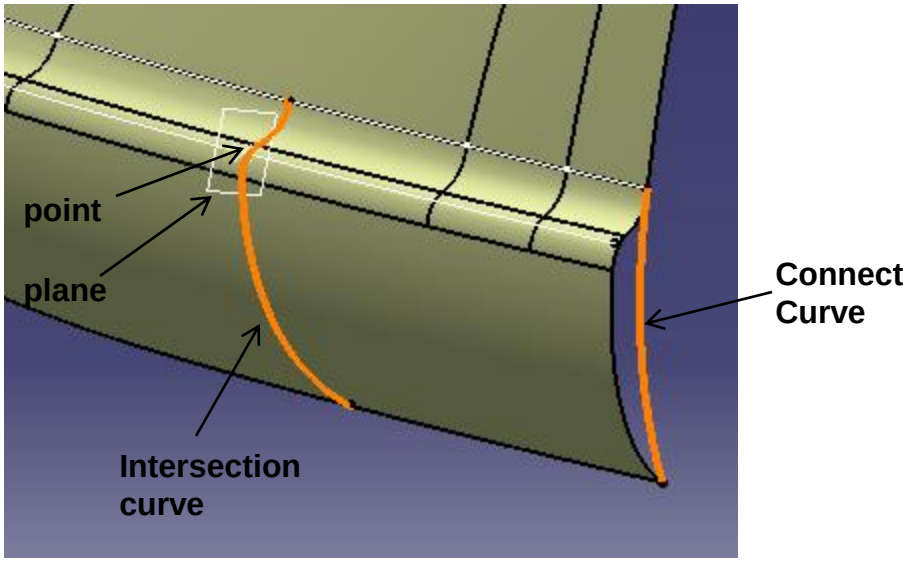
- Create a Swept surface
- Create a shape Fillet (R10mm)

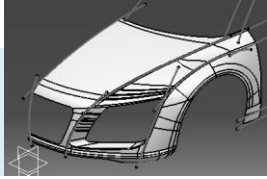




- Create a point on the boundary
- Create a plane at the point

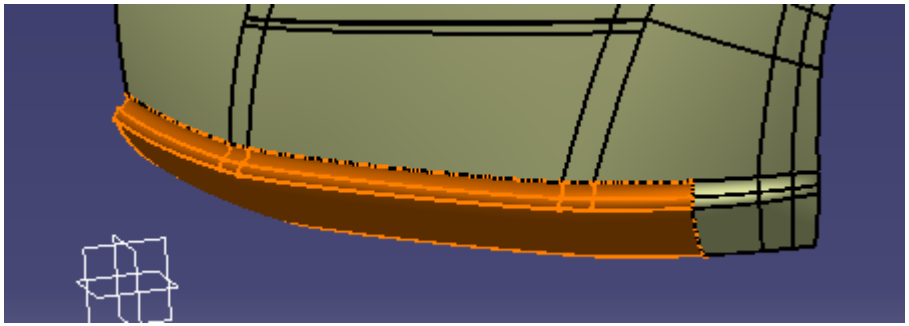
- Create an intersection curve
- Create a connect curve

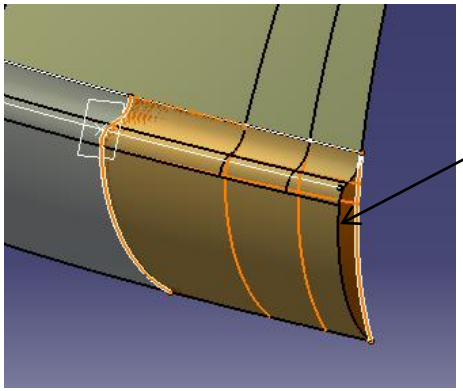


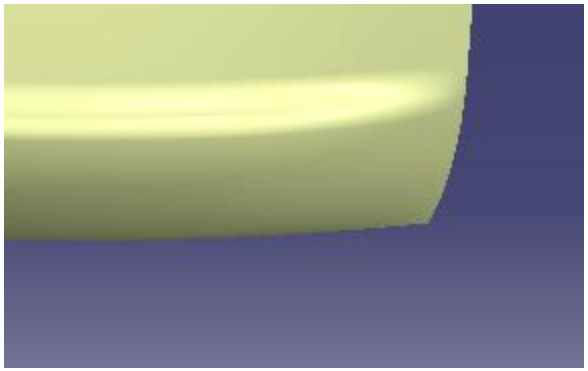


Tutorial 8B

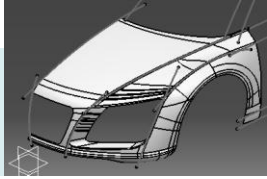
- Create a multi-sections surface
  - 2 Sections & 2 Guides
  - Tangent to surfaces
- Split the Fillet surface by the intersection curve



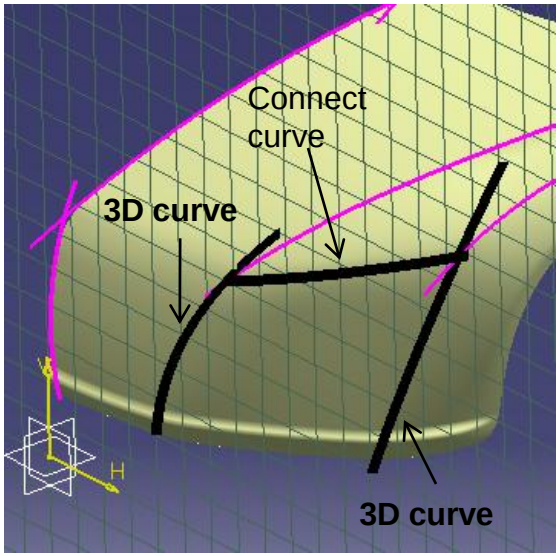


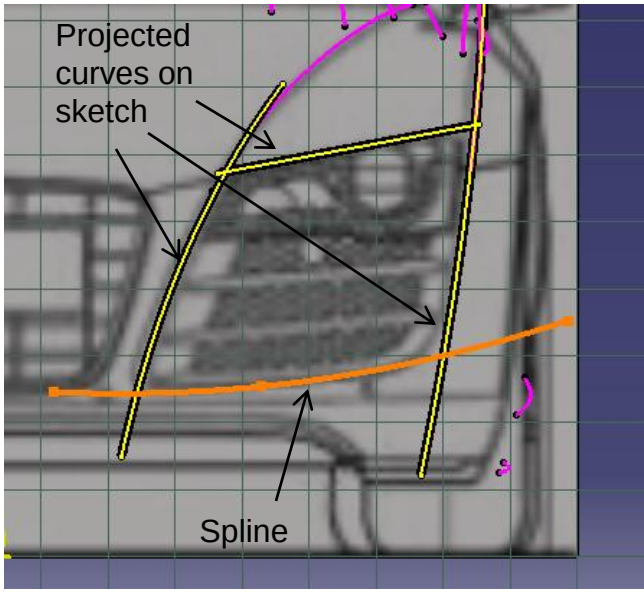


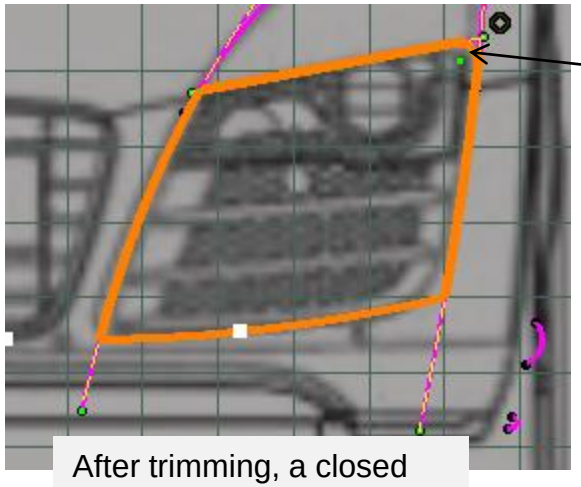
Tutorial 8B



- Create a sketch on Yz plane
  - Create 3 projected curves,
  - Create a spline curve
  - Create a fillet R25mm
  - Trim curves to form a closed profile

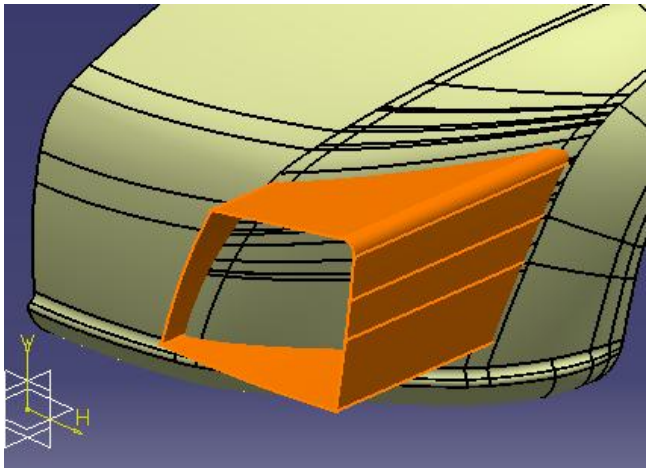






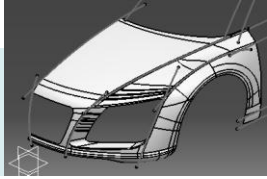
After trimming, a closed profile is formed

- Create an extruded surface (750mm)

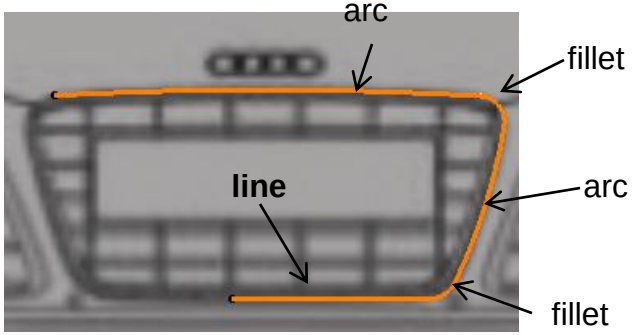


Non-Commercial Use

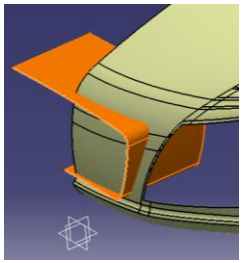
Tutorial 8B

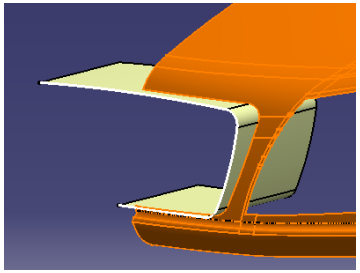


- **Insert a new geometrical set (name it as "parting _surface")**

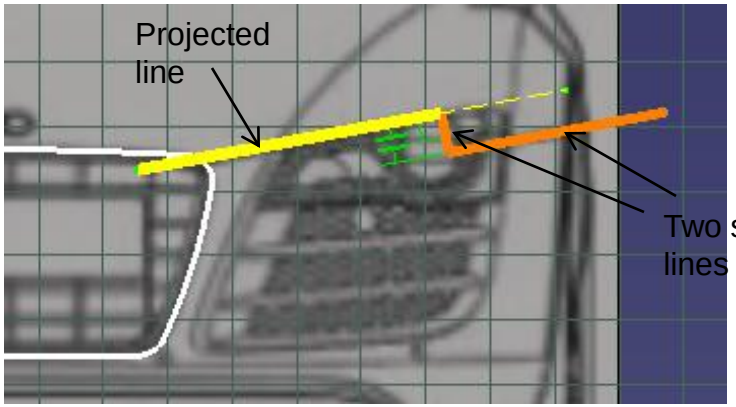


- Create a sketch on YZ plane
- Create an extruded surface (350mm)
- Split surface (by the extruded surface)

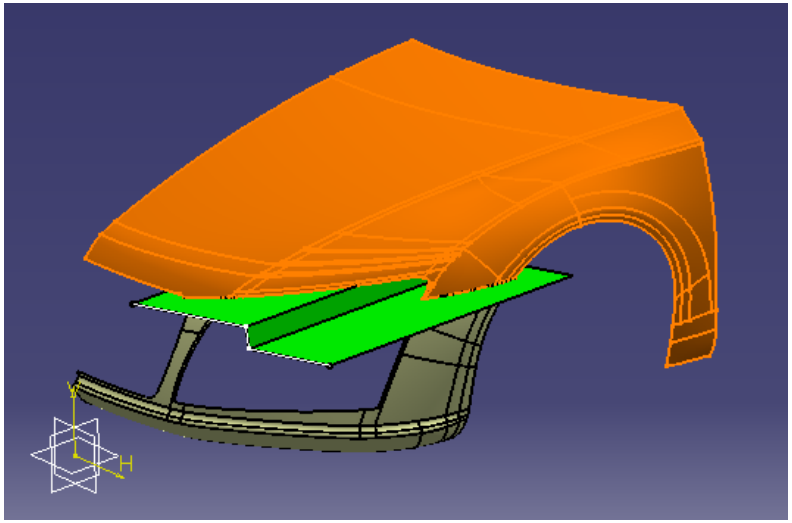


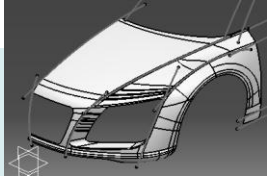


- Create a sketch on YZ plane



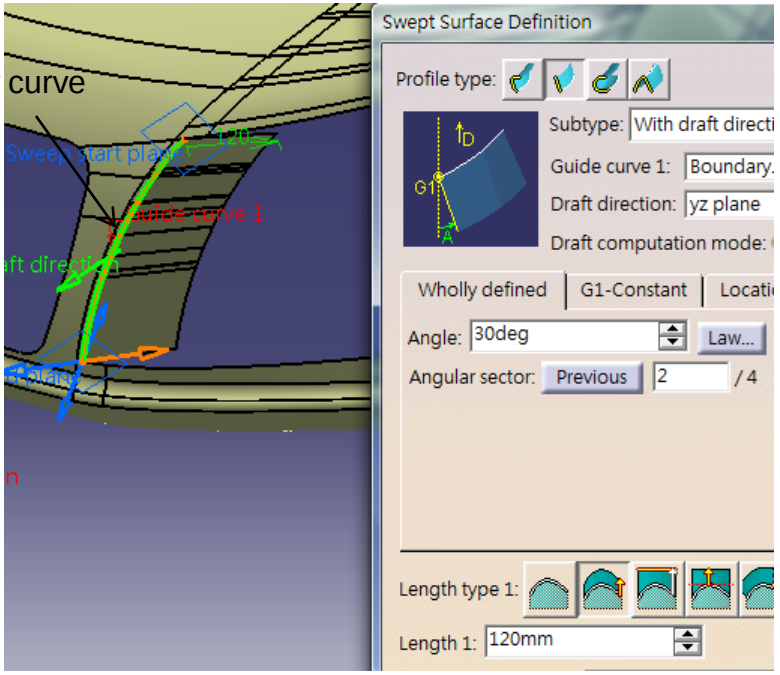
- Create an extruded surface (860mm)
- Split the surface into Two (keep both sides)



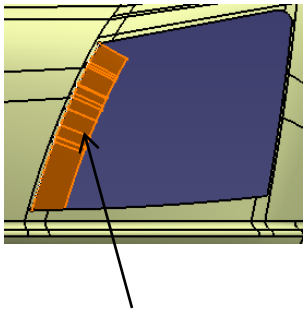


Tutorial 8B

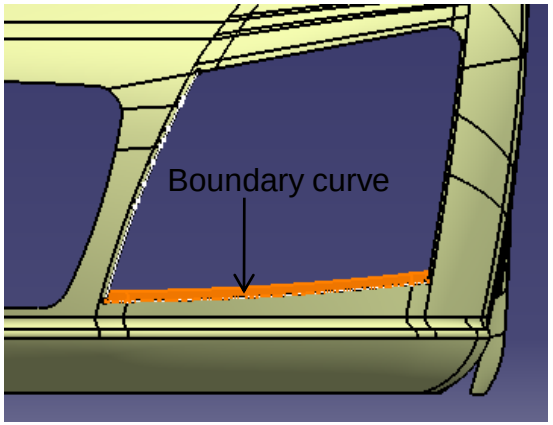
- **Right-click Geometrical set "Front Body"**
- **Select "Define in Work Object"**

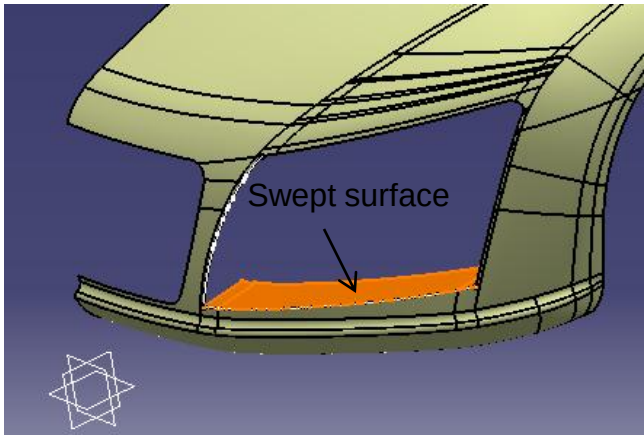


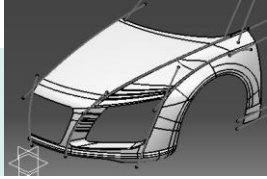
- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle = 30 deg
  - Length = 120mm



- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle =8 deg
  - Length = 100mm

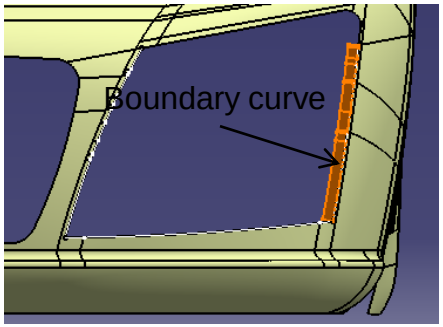


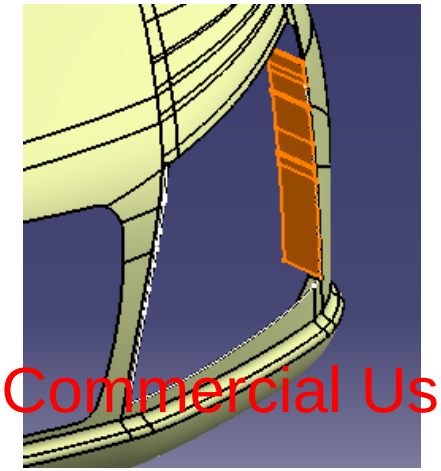




Tutorial 8B

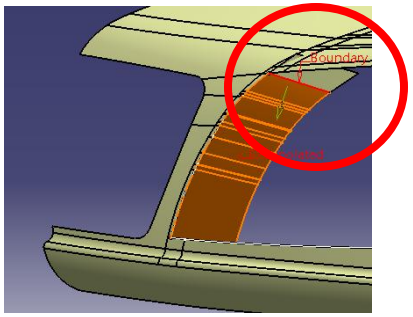
- Create a boundary curve
- Create a swept surface
  - Profile Type = Linear
  - Subtype = with draft direction
  - Guide curve = Boundary
  - Draft direction = yz plane
  - Angle =10 deg
  - Length = 100mm



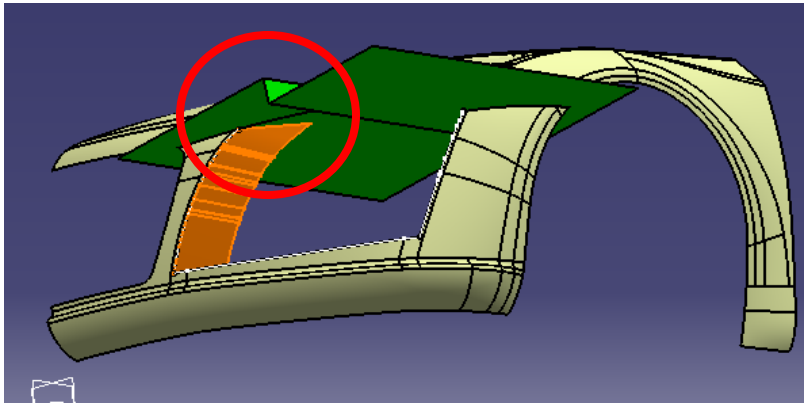


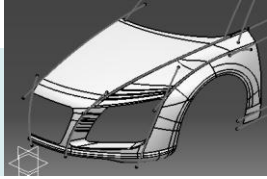
Not For Commercial Use

- Extrapolate the surface by 100mm (assemble result)



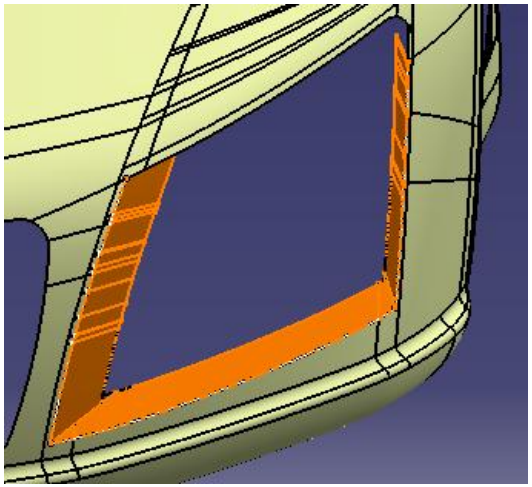
- Split the extended surface by the parting surface

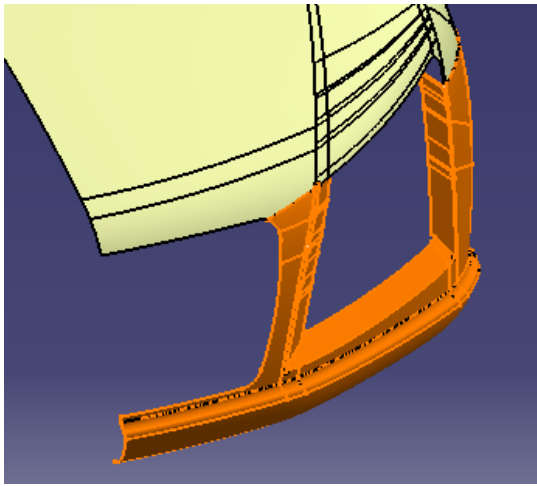




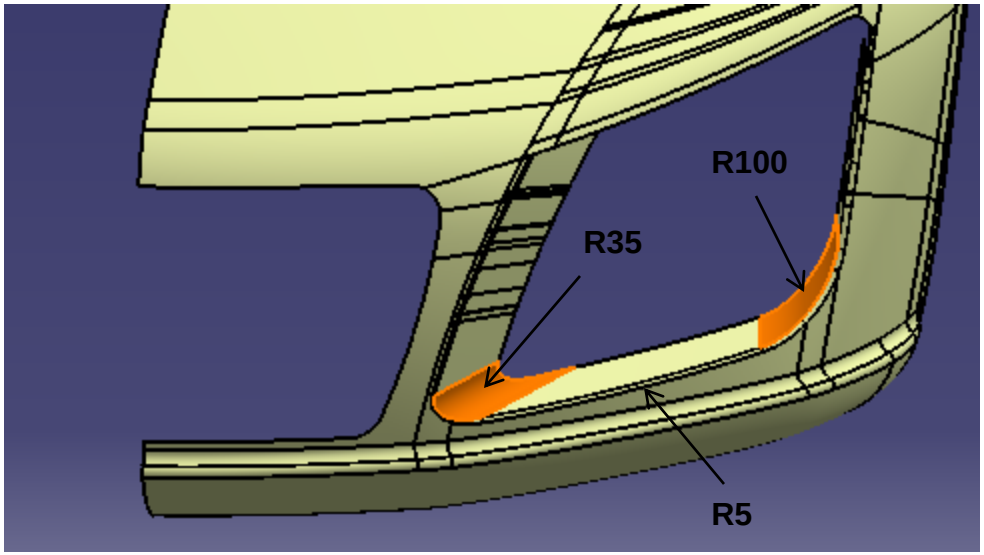
Tutorial 8B

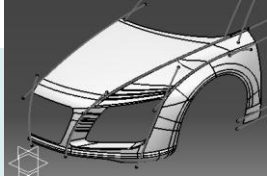
- Mutual Trim the 3 swept surfaces
- Join surfaces





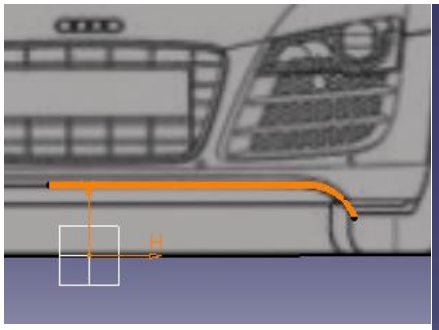
- Edge fillet 35mm
- Edge fillet 100mm
- Edge fillet 5mm

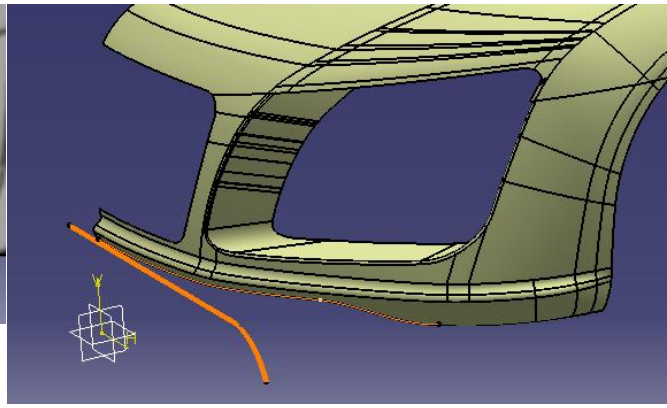




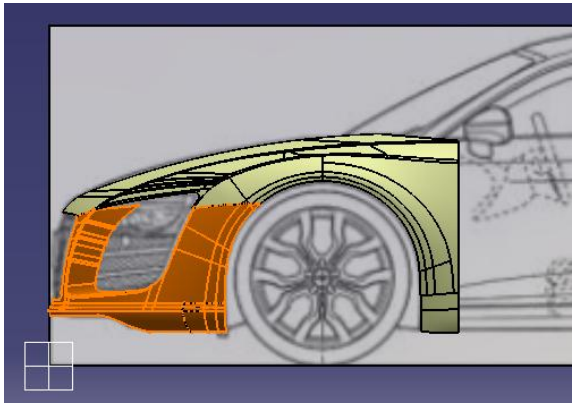
Tutorial 8B

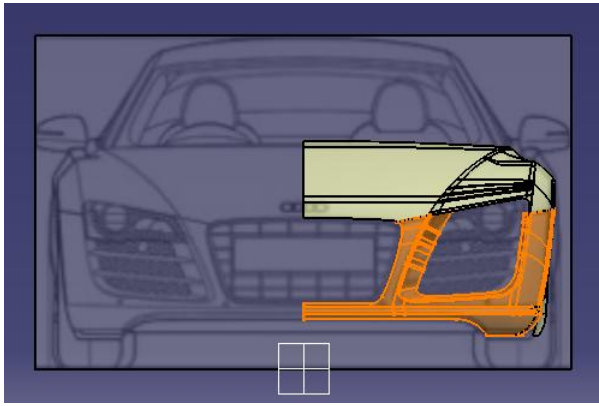
- Create a sketch on YZ plane
- Project the sketch onto surface
- Split surface by the projected sketch





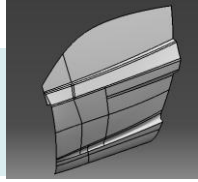
- Check the finished model with the reference pictures
- Modify the model if needed
- Save file “R8_master_a.catpart”





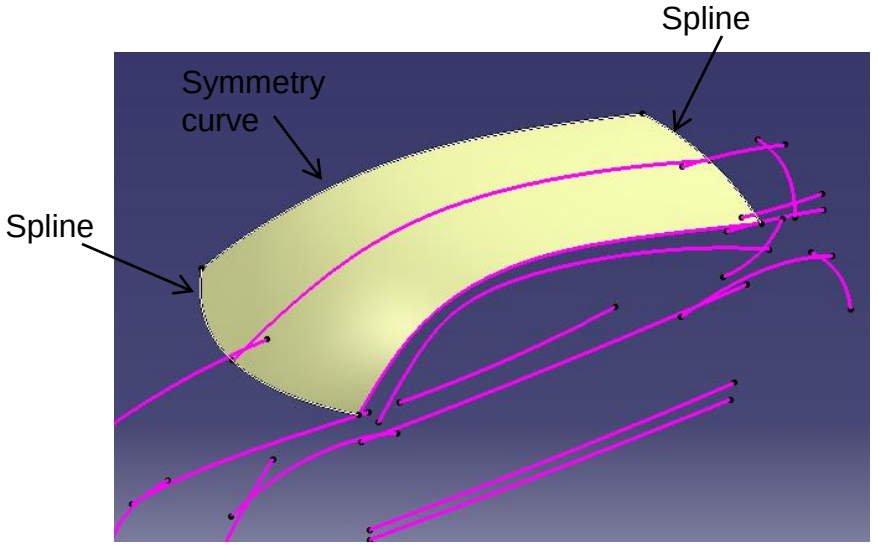
Middle Body (master)

Tutorial 8C

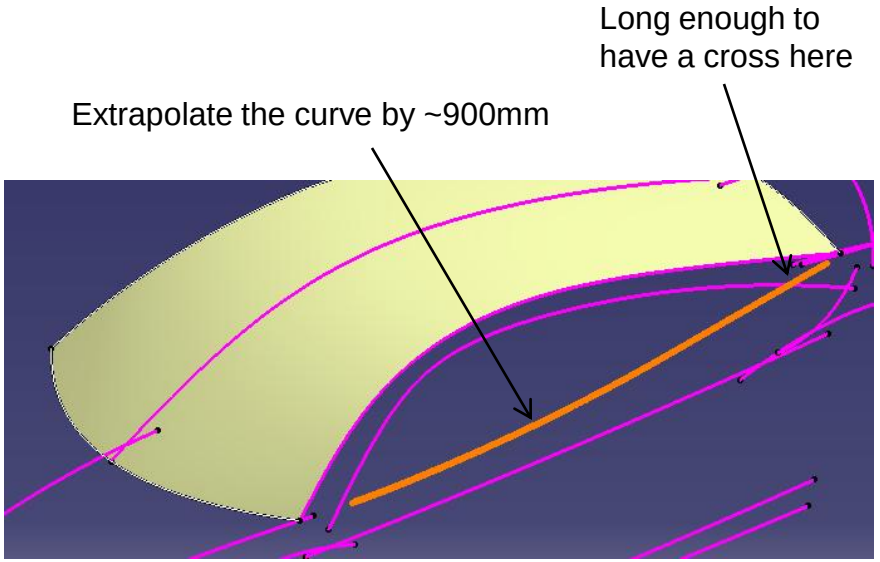


- **Insert a New geometrical set "middle_body"**

- Create a symmetry 3d curve
- Create two 3d spline curves
- Create a multi-sections surface (3 sections, 2 guides)

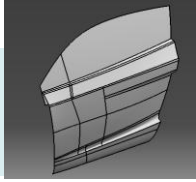


- Extrapolate a curve (900mm, curvature, assemble result)

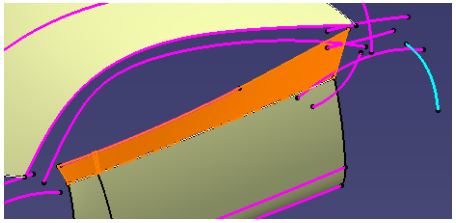


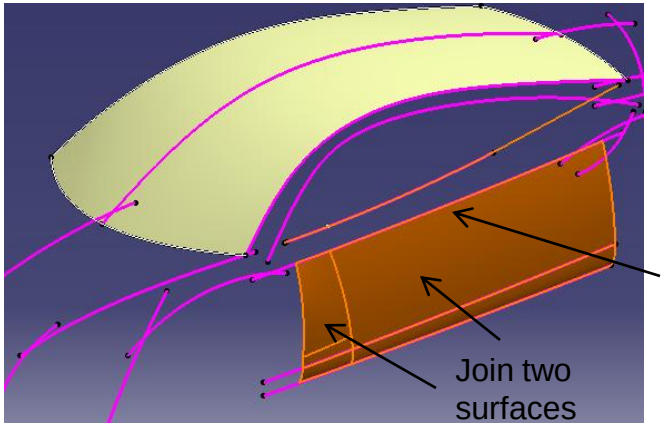
Middle Body (master)

Tutorial 8C

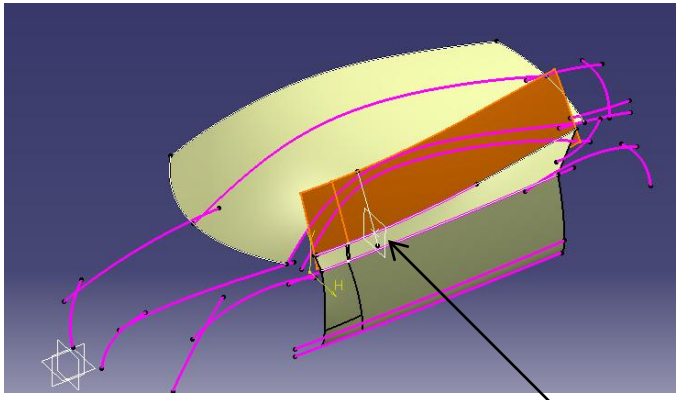


- Join two surfaces
- Hide the 3d curve
- Create a boundary curve on the edge
- Create a blend surface
  (2 curves, no supports)

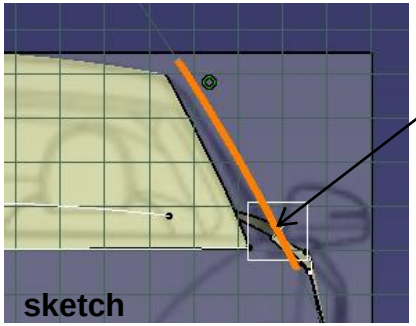




- Create a extremum point (direction: xz plane)
- Create a plane at the point
  - Parallel through point
  - Reference: YZ plane
  - Point: Extremum point



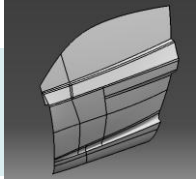
- Create a sketch on the plane (Draw an arc)
- Create a swept surface (profile, guided curve)



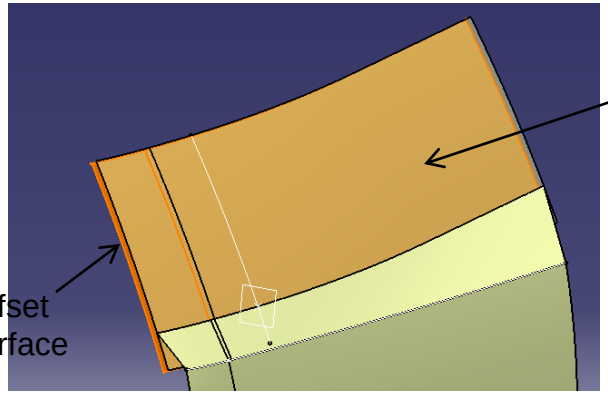
Non-Commercial Use

Middle Body (master)

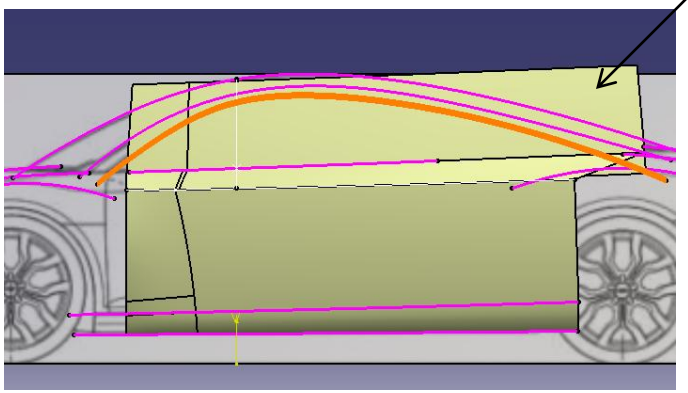
Tutorial 8C



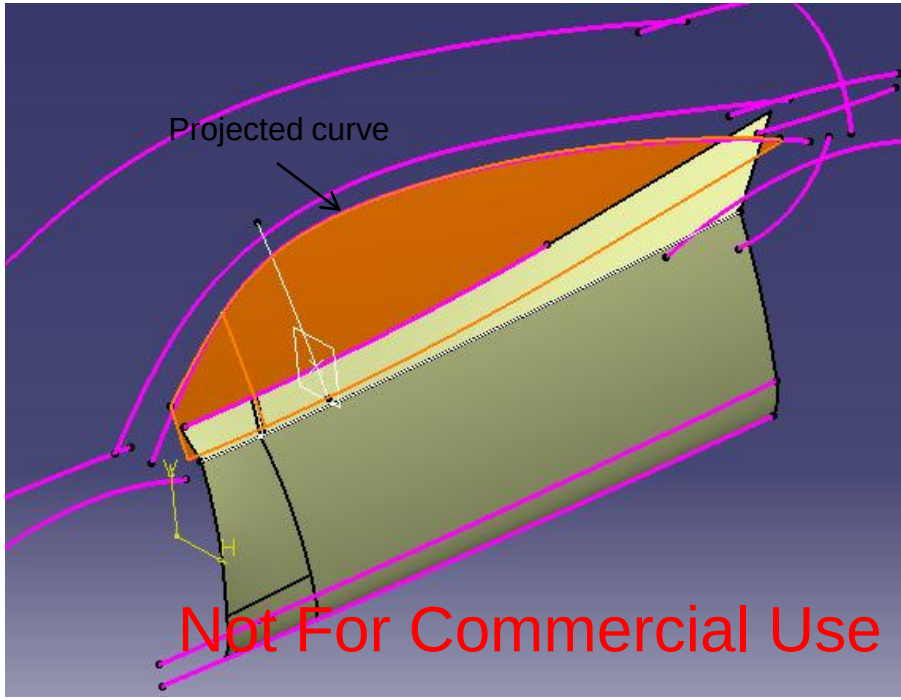
- Create offset surface (15mm, inward)



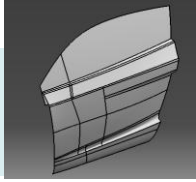
- Project 3d curve on the offset surface (Direction: xz direction)



- Split surface by the projected curve

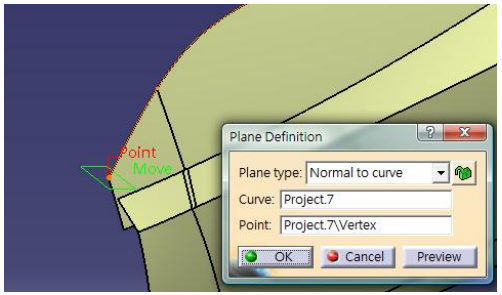


Not For Commercial Use

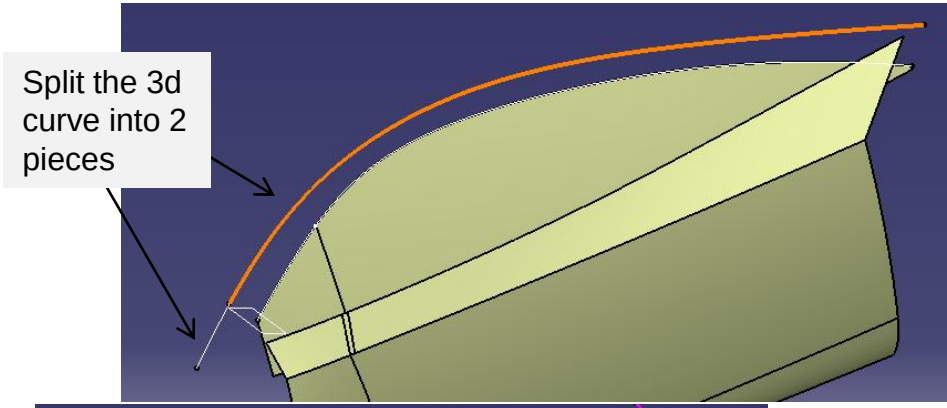


Tutorial 8C

- Create a plane at the endpoint of the projected curve. (Normal to curve)



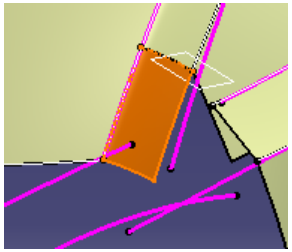
- Split the 3d curve by the plane **(into 2)**

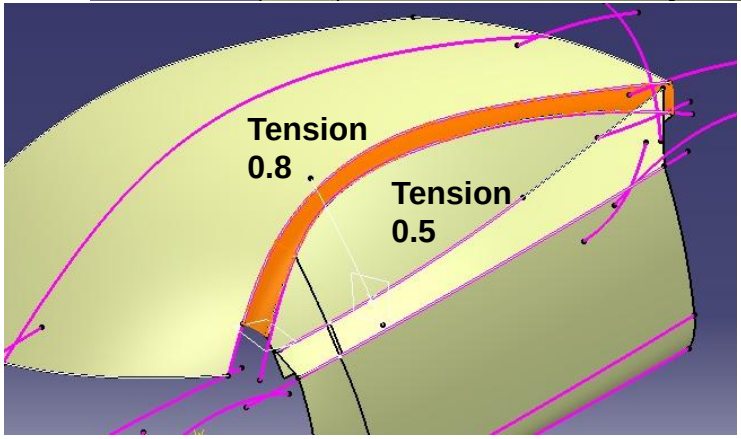


- Create a blend surface

  (2 curves, 2 supports, tangency continuity, tension 0.8, 0.5)

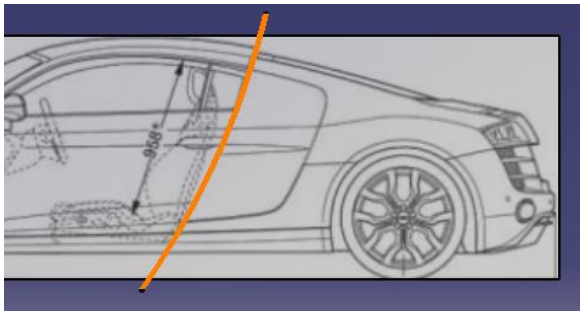
- Create a swept surface

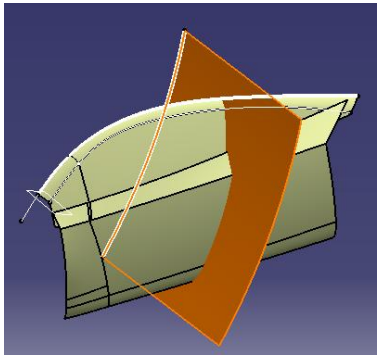




Tutorial 8C

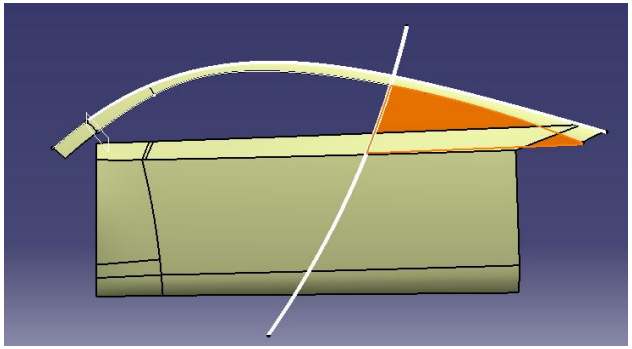
- **Right-Click Geometrical set “parting_surface”, select “Define in work object”**





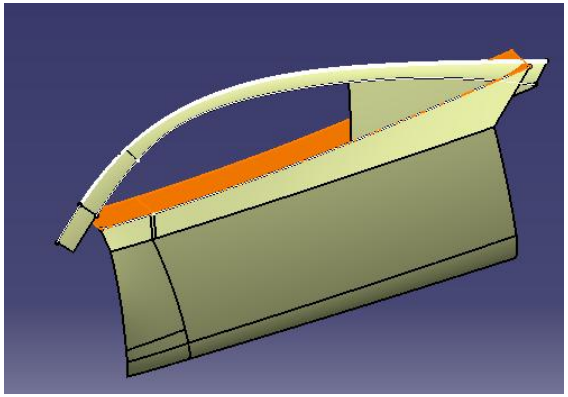
- Create a sketch on XZ plane (draw a spline)
- Create an extruded surface (1500mm)

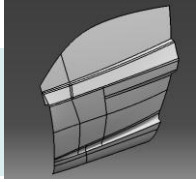
- Right-Click Geometrical set “middle_body”, select “Define in work object”



- Split the offset swept surface by the extruded surface

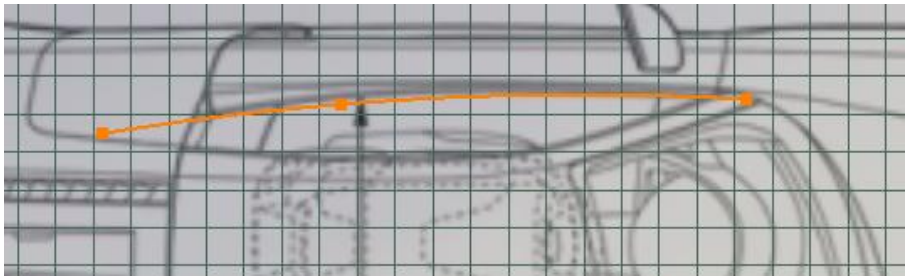
- Create an Extruded Surface (Direction: Xz plane, L=200mm)



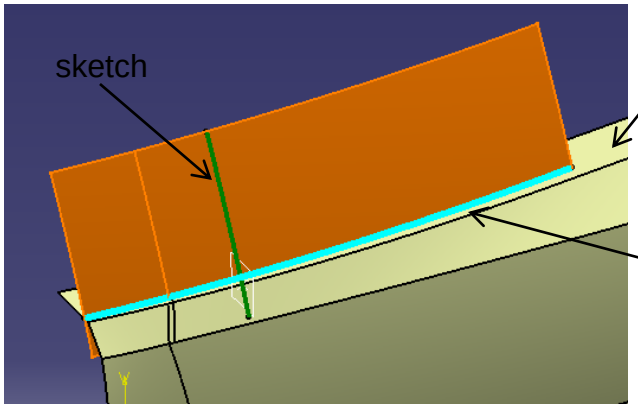


Tutorial 8C

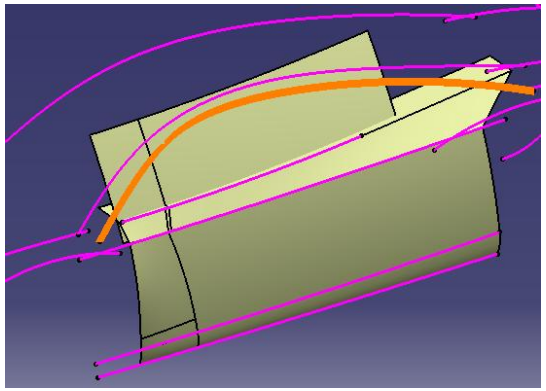
- Create a sketch on XY plane (Draw a spline)
- Project it on the extruded surface

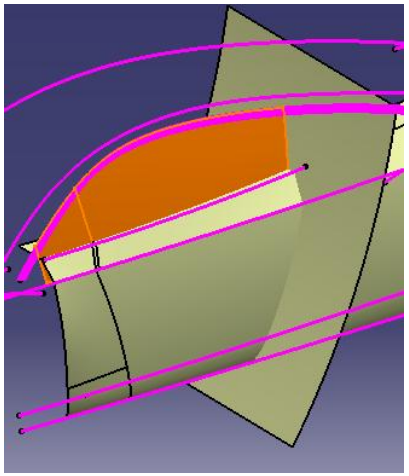


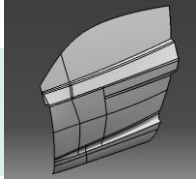
- Create a swept surface
  (Profile: Projected curve, Guide: Sketch)



- Project 3d onto this swept surface
- Split surface by the projected curve
- Split surface by the extruded surface in the geometrical set “parting_surface”

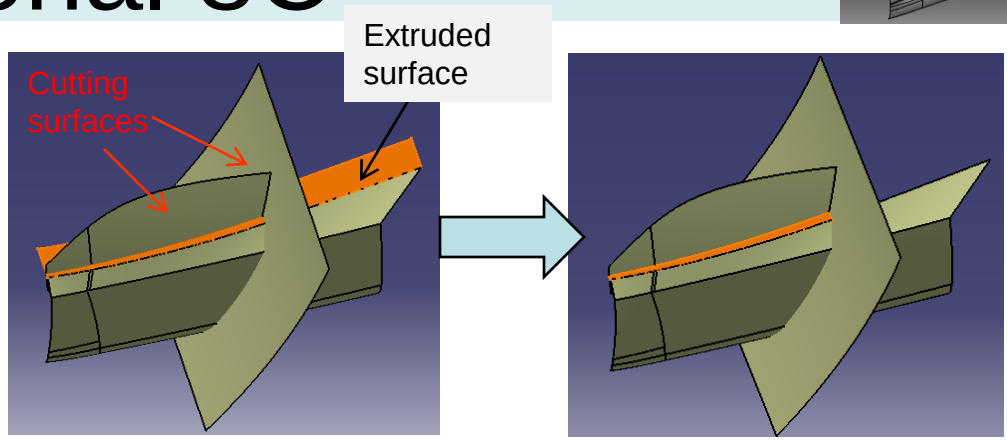




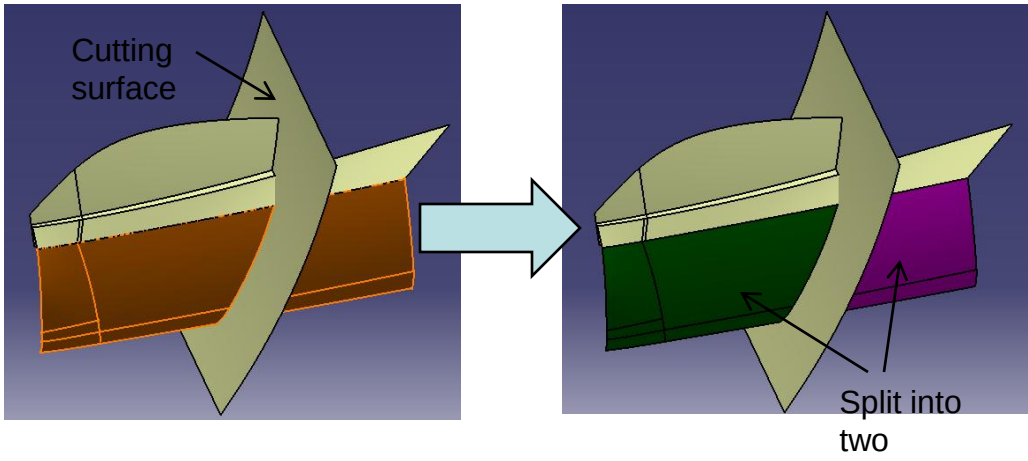


Tutorial 8C

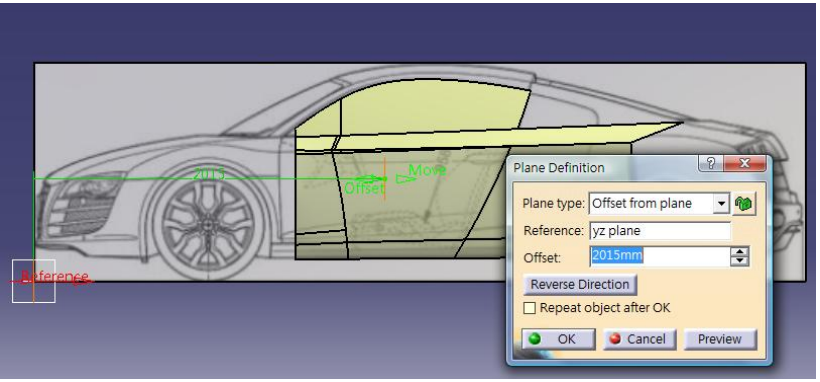
- Split the extruded surface (by 2 cutting surfaces)



- Split join surface **into 2** (by the parting surface)



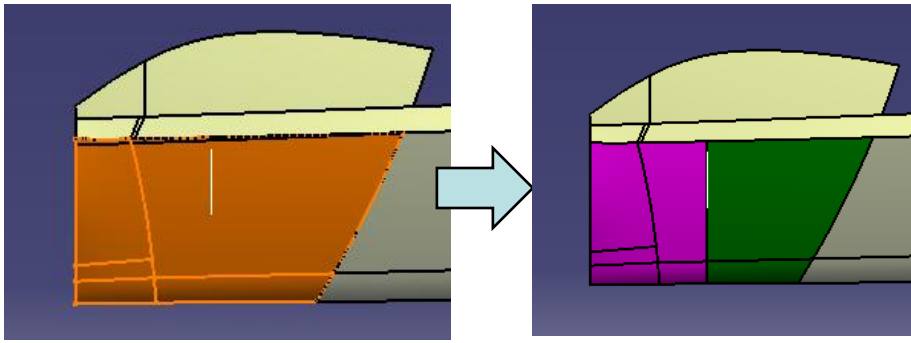
- Create an offset plane
  (Reference: Yz plane, offset 2015mm)



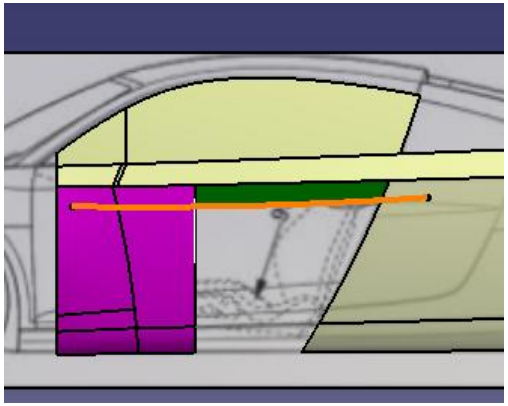
Not For Commercial Use

Tutorial 8C

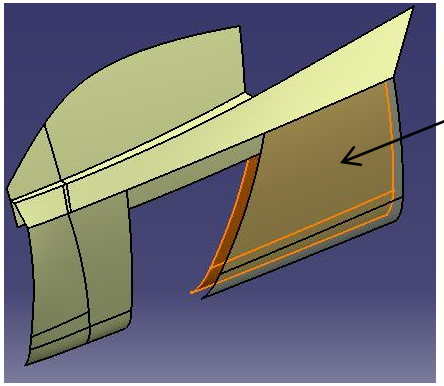
- Split surface into 2 by the offset plane



- Create a sketch on Xz plane (Draw a spline)
- Project sketch on the split surface
- Split surface by projected sketch

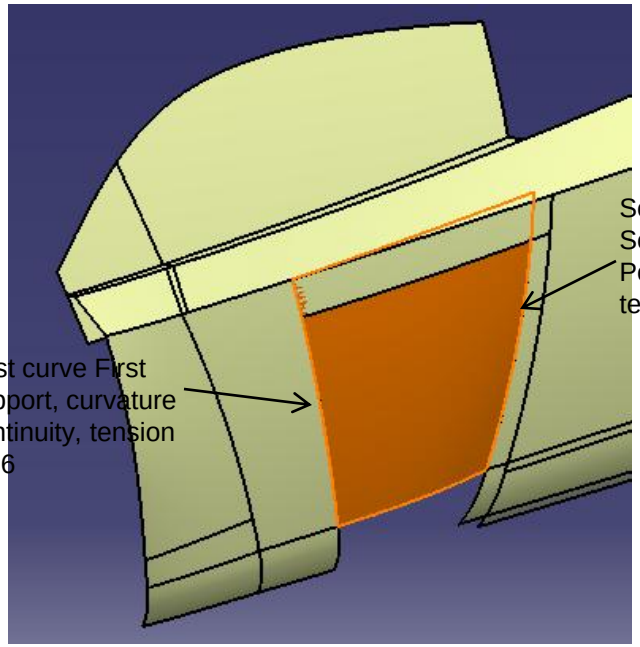


- Create a Translate Surface
  - Element: Split surface
  - Direction: XZ plane
  - Distance: -60mm

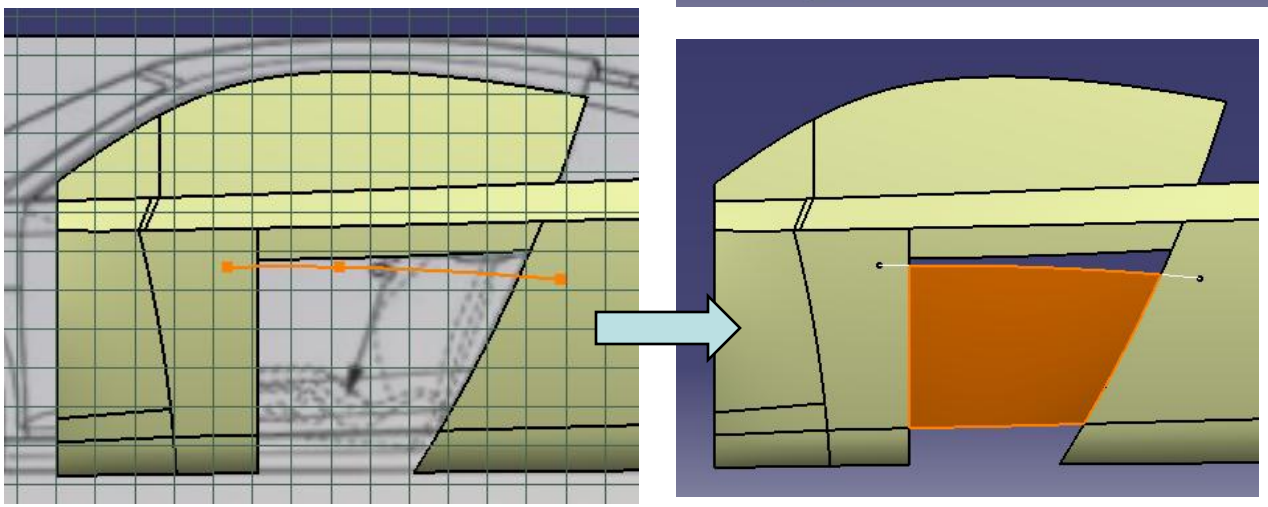


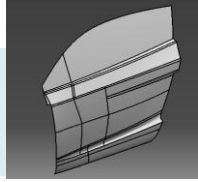
Tutorial 8C

- Create a blend surface
  - First curve First support, curvature continuity, tension =0.6
  - Second curve Second support, point continuity tension =1



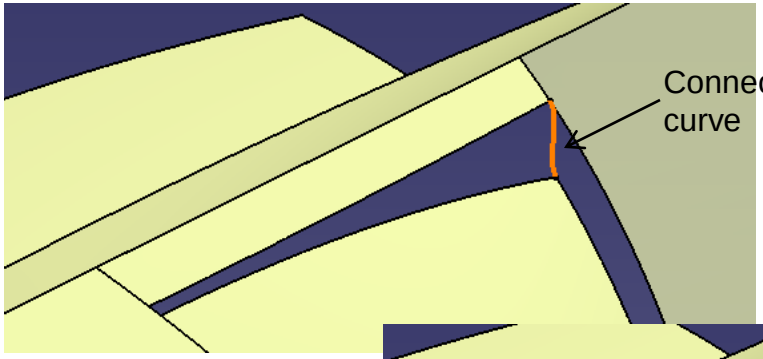
- Create a sketch on Xz plane (Draw a spline)
- Project sketch onto the blend surface
- Split the surface by projected sketch



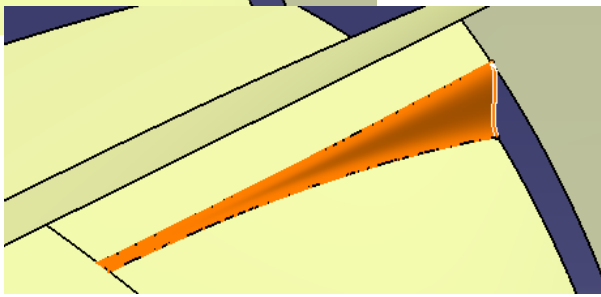


Tutorial 8C

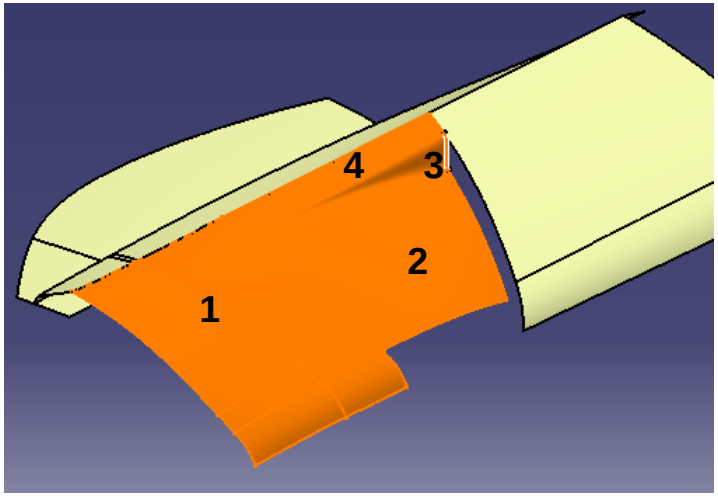
- Create a connect curve (tangent, tangent)

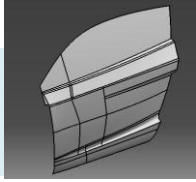


- Create a fill surface
  - 4 curves, 3 supports
  - Tangent Continuity



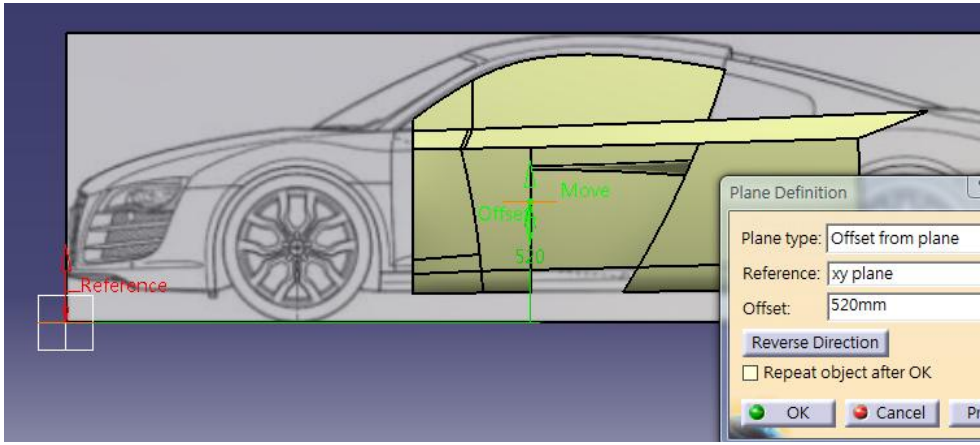
- Join surfaces (4 surfaces)



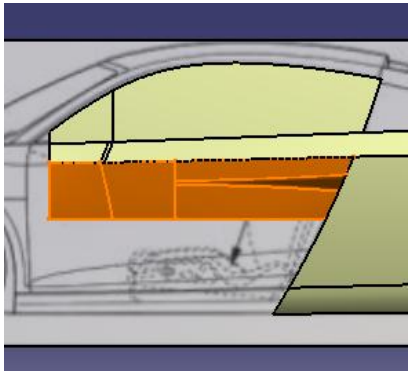


Tutorial 8C

- Create an offset plane
  (Reference xy plane, Offset 520mm)

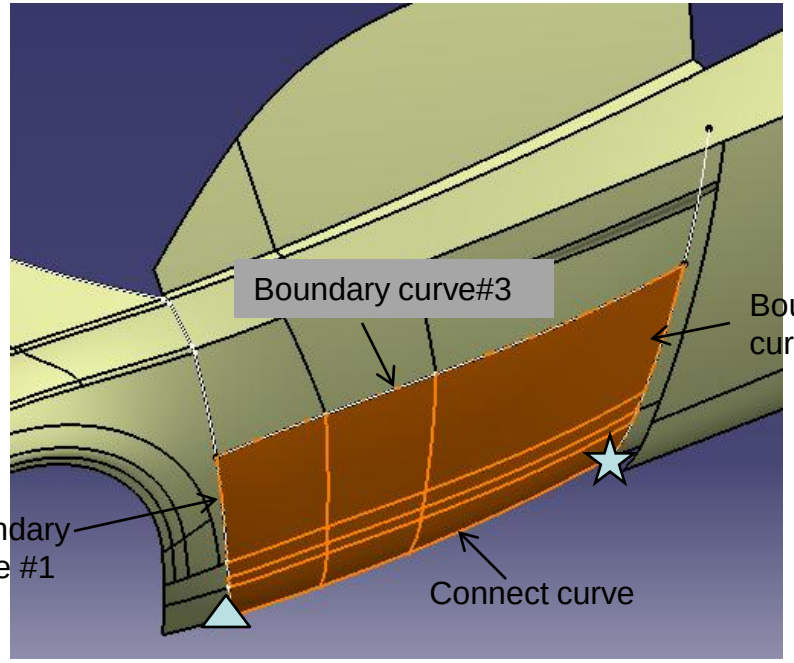


- Split surface

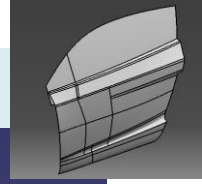


- Make the geometrical set “front_body” visible

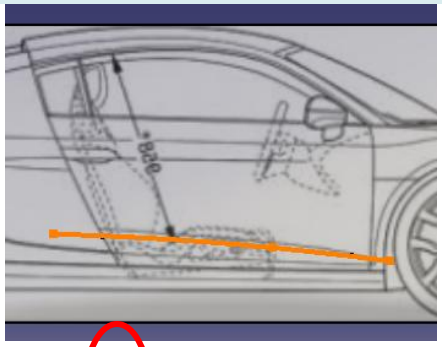
- Create a connect curve (tangent continuity at point△ ; point continuity at point☆)
- Create 2 boundary curves
- Create a multi-sections surface
  - Section: Boundary Curve#1, Tangent to Surface
  - Section: Boundary Curve#2, No Tangent Support
  - Guide: Boundary Curve#3, Tangent to Surface
  - Guide: Connect Curve

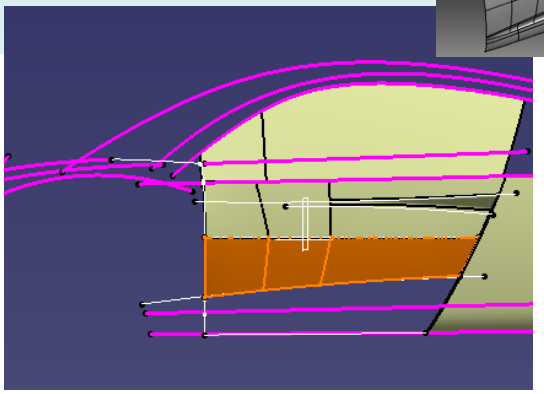


Tutorial 8C

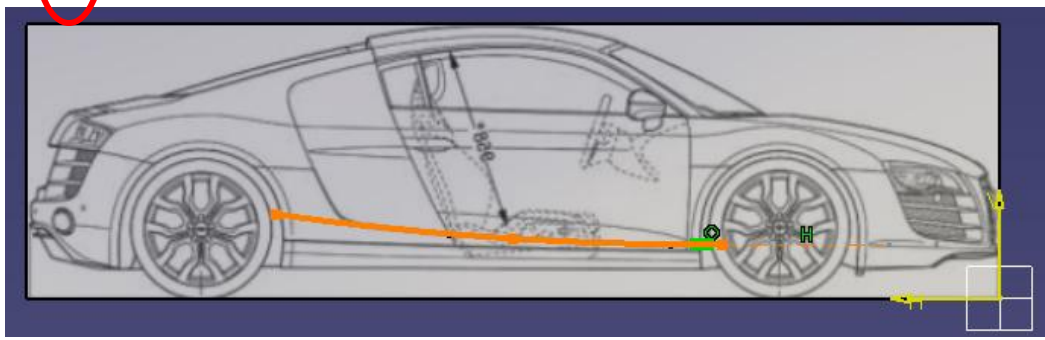


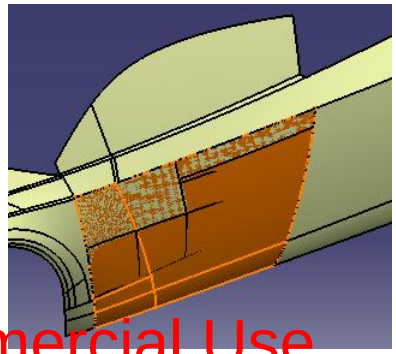
- Create a sketch on xz plane (Draw a spline)
- Project it onto the surface
- Split surface

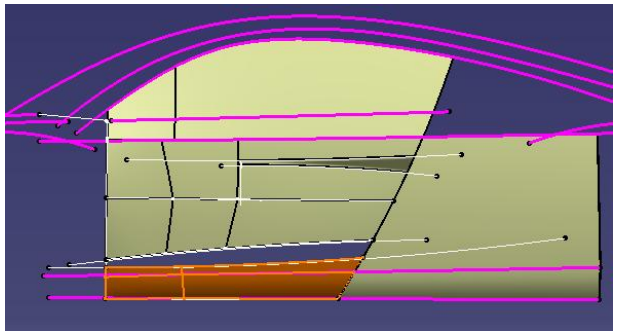


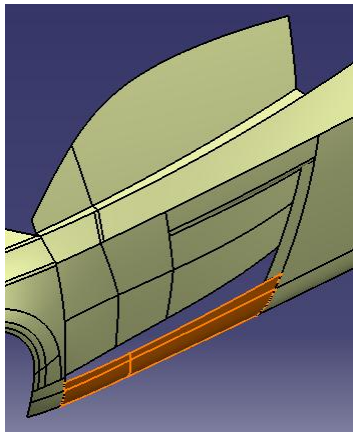


- Create a sketch on xz plane (Draw a spline)
- Project it on the old split surface (which should be located before “Translate surface”, page 38)
- Split surface by the projected curve

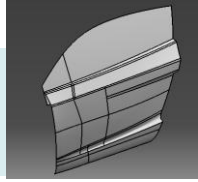






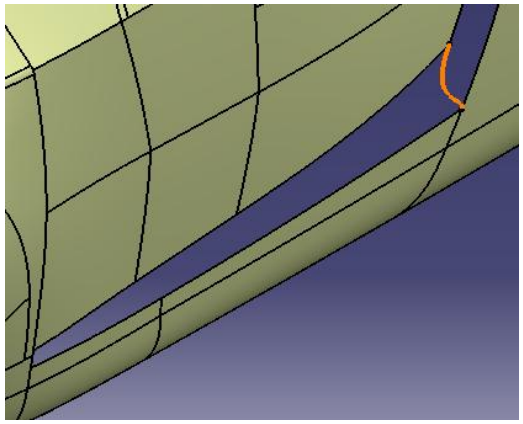


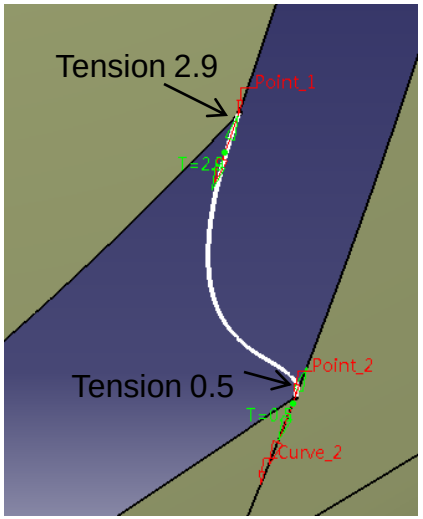
Not For Commercial Use



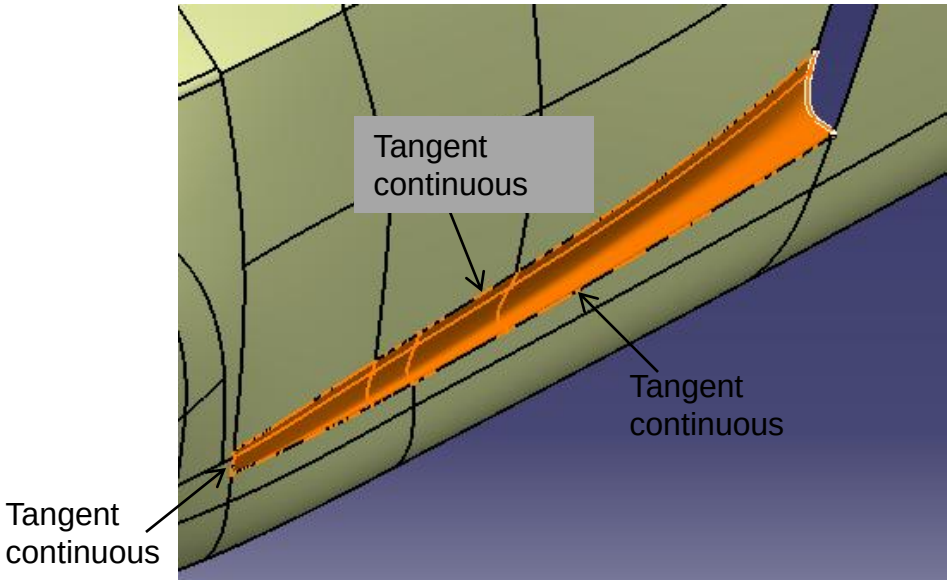
Tutorial 8C

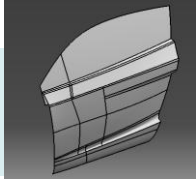
- Create a connect curve
  - First Support: tangency, tension 2.9
  - Second Support: tangency, tension 0.5





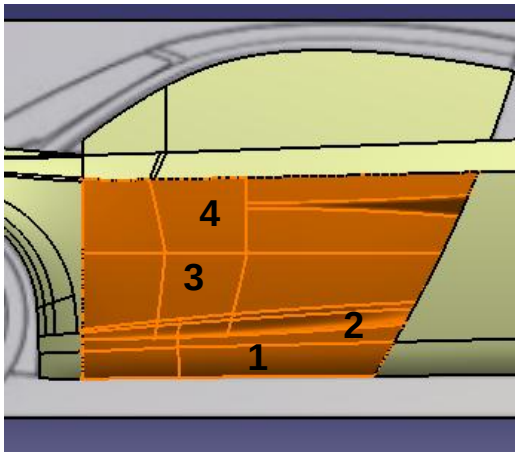
- Create a multi-sections surface
  - 4 curves, 3 supports
  - Tangent Continuity

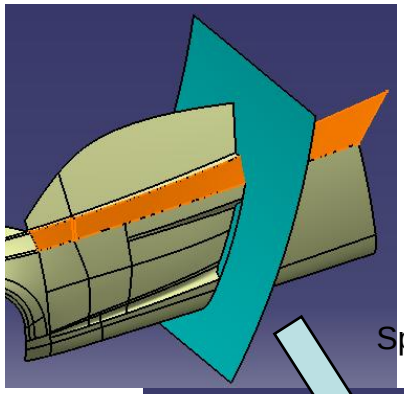




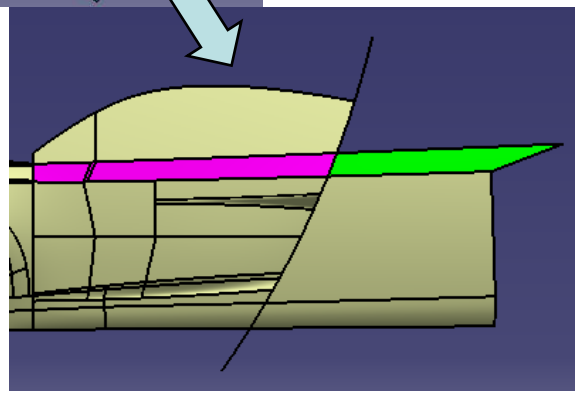
Tutorial 8C

- Join Surfaces (Total 4)



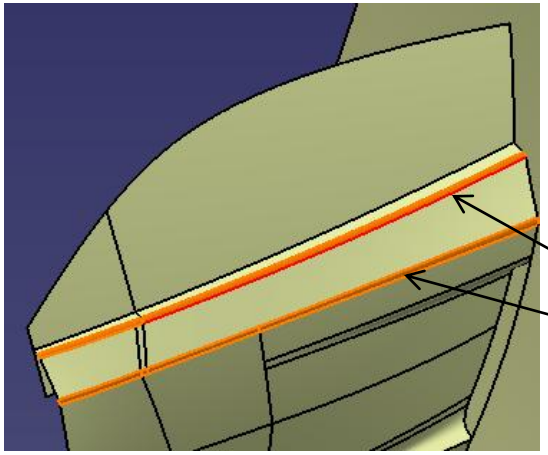


Split surface



- Split the surface into 2 (by parting surface)

- Create Shape Fillet (Surface-surface, R25mm)
- Create Shape Fillet (Surface-surface, R20mm)



Fillet R20mm

Fillet R25mm

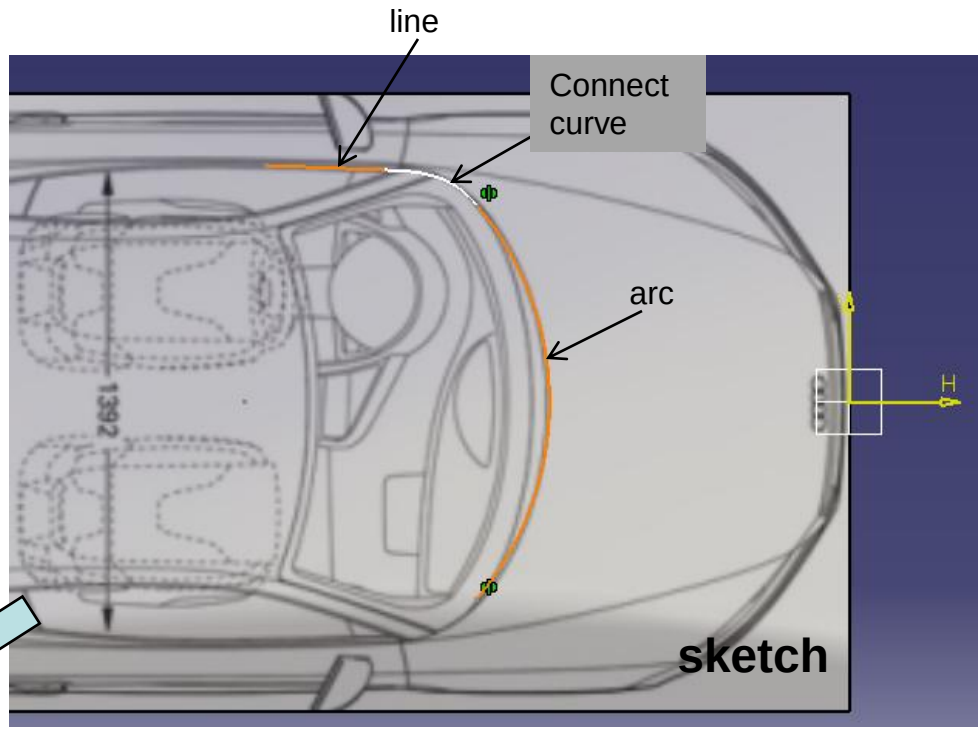
Non-Commercial Use

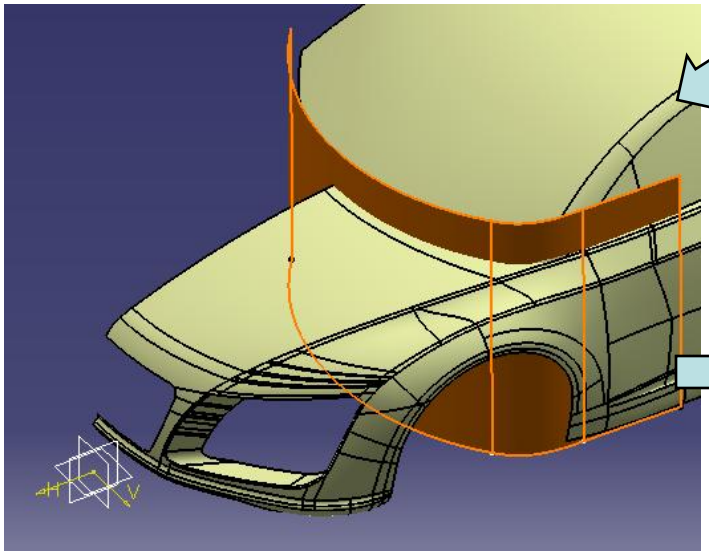
Tutorial 8C

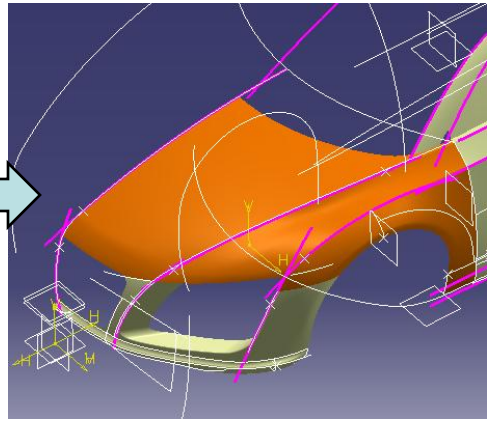
- **Right-Click the Geometrical set "front_body", Select "Define in work object"**

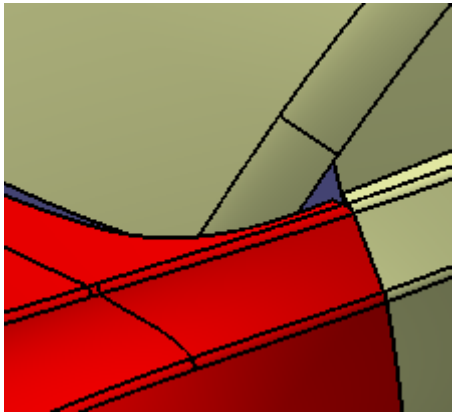
- Create a sketch on Xy plane
  - Draw a symmetric arc
  - Draw a line
  - Draw a connect curve

- Create an extruded surface (1000mm)
- Split surface by the extruded surface
- Save file "R8_master_a.catpart"



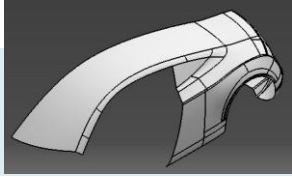




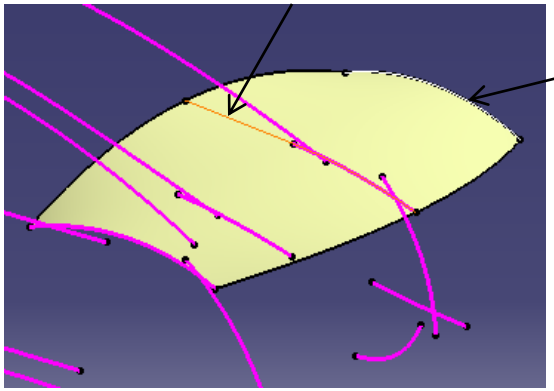


Back_body (master)

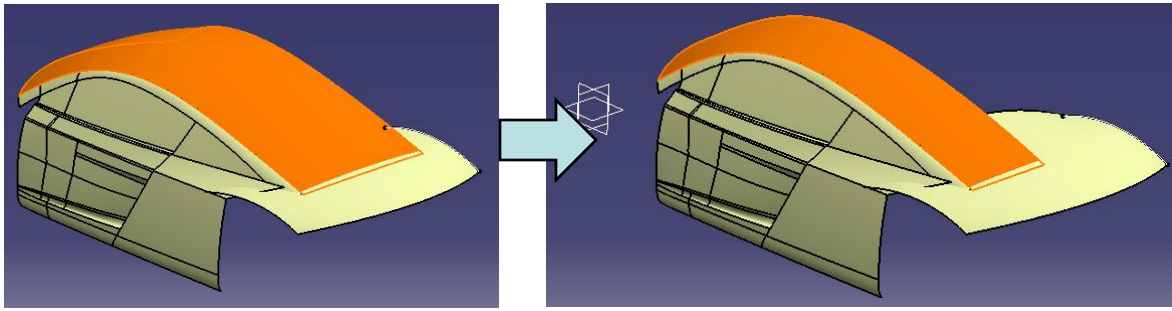
Tutorial 8D



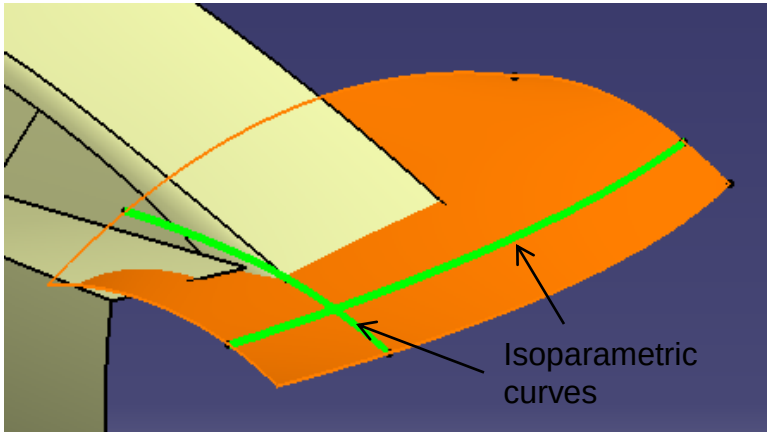
- **Insert a New geometrical set “back_body”**



- Create a symmetry curve
- Extrapolate the 3d curve (select “assemble result)
- Create a multi-sections surface (3 sections)
- Split the old multi-sections surface by XZ plane

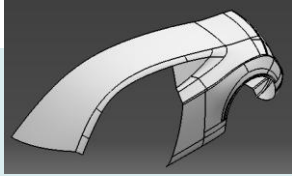


- Create Two Isoparametric curves on the multi-sections surface

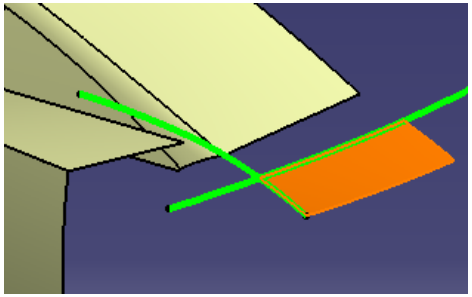


Back_body (master)

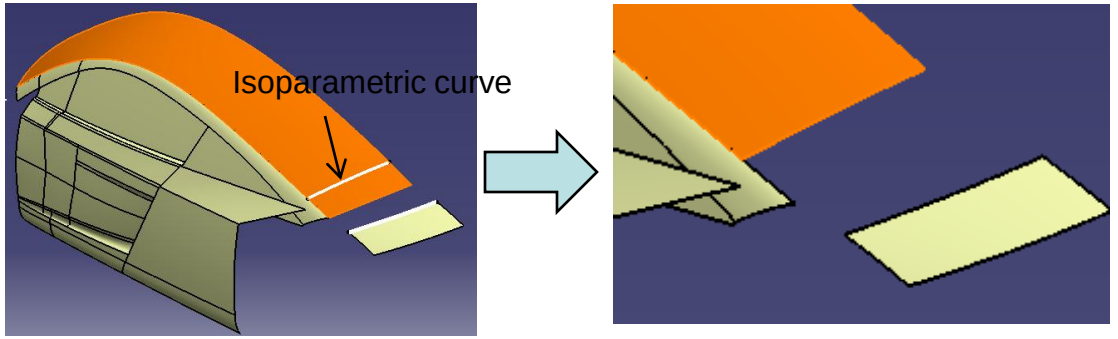
Tutorial 8D



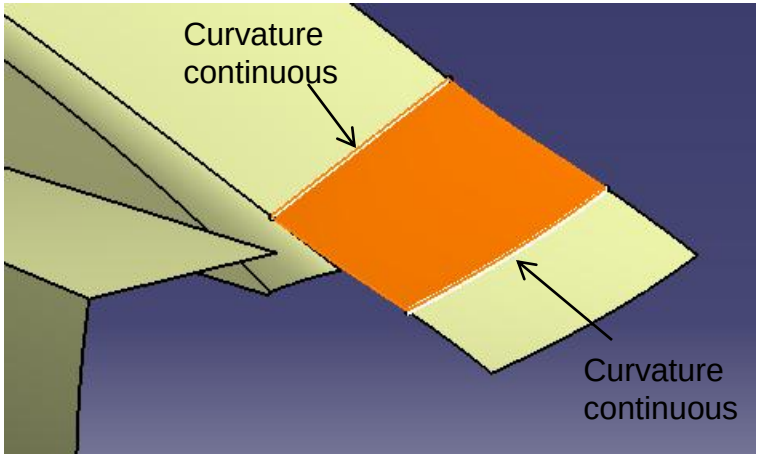
- Split the multi-sections surface by 2 iso curves & XZ plane



- Create isoparametric curve
- Split surface by this iso curve



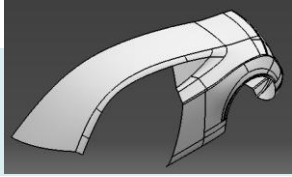
- Create a blend surface (curvature continuous on both sides, tension 0.8)



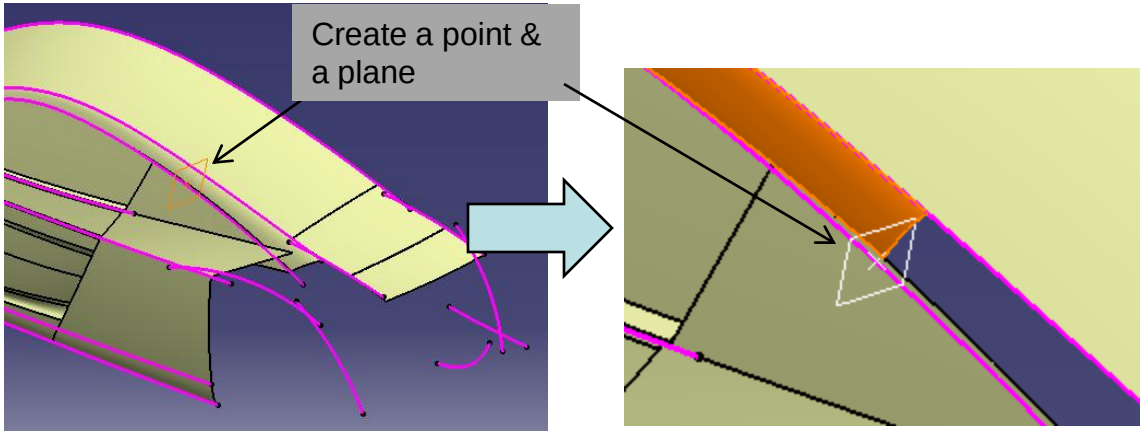
Not For Commercial Use

Back_body (master)

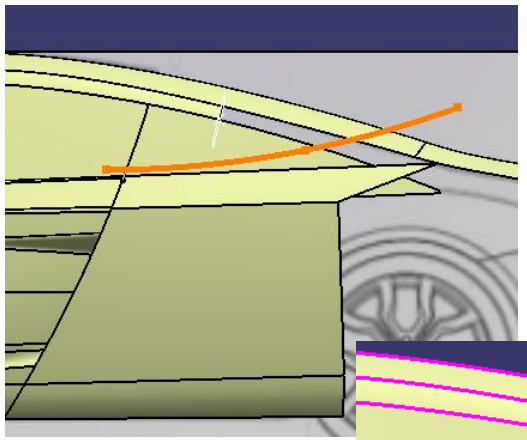
Tutorial 8D

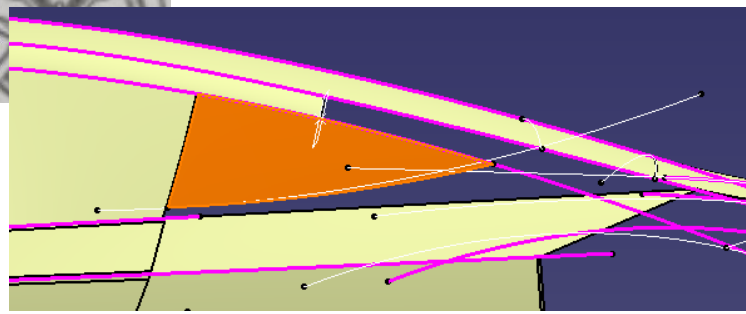


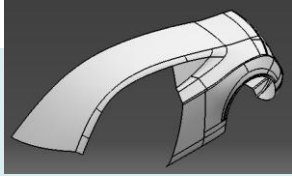
- Create a point on 3D curve
- Create a plane at the point
- Split the old blend surface by the plane



- Create a Sketch on XZ plane (Draw a spline)
- Project sketch
- Split surface by projected sketch

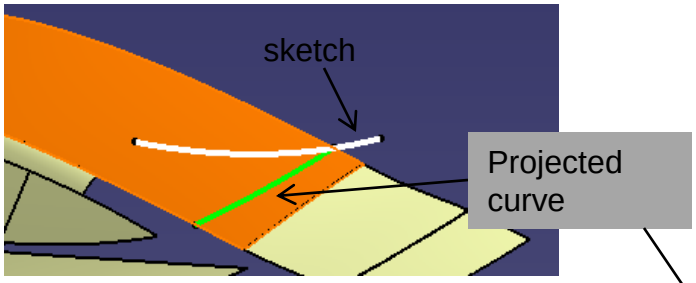




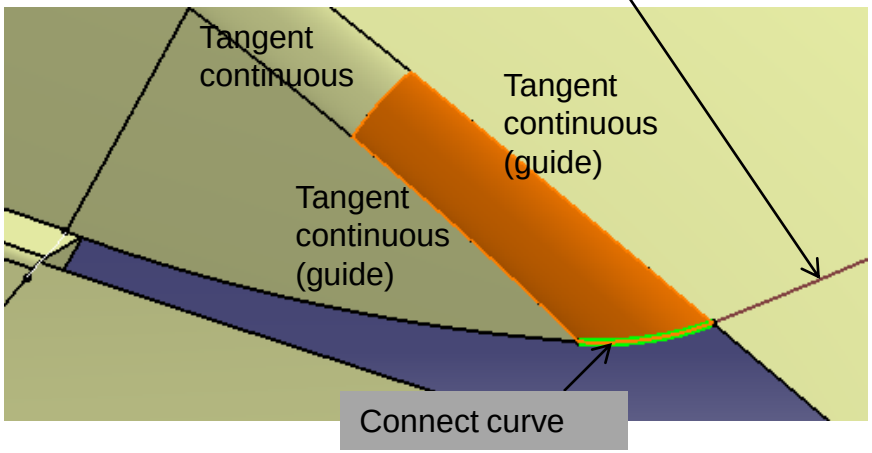


Tutorial 8D

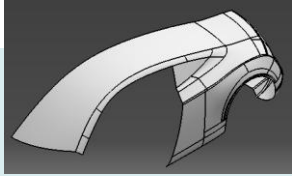
- Project the same sketch onto the split surface
  - Direction = XZ plane



- Create a connect curve (tangent continuous on both ends)

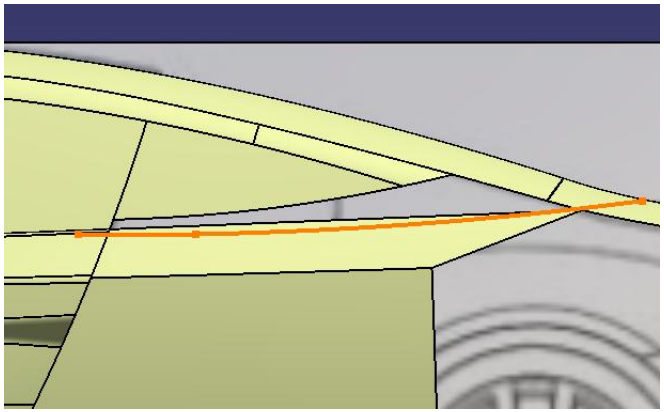


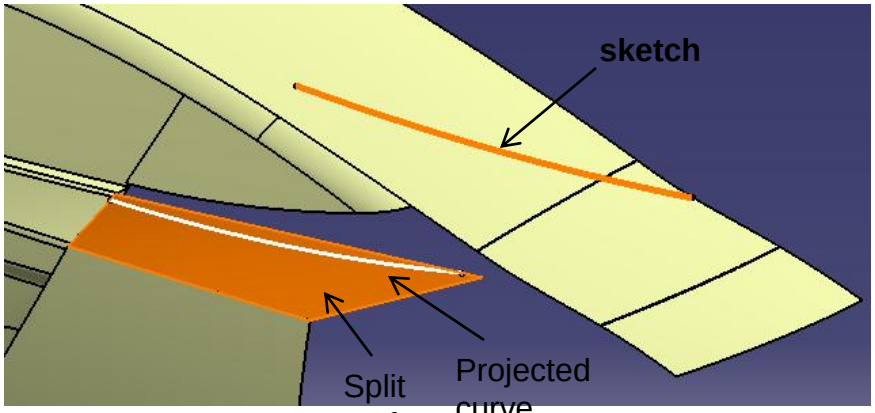
- Create a multi-sections surface
  - 2 sections (1 tangent support)
  - 2 guides (2 tangent supports)



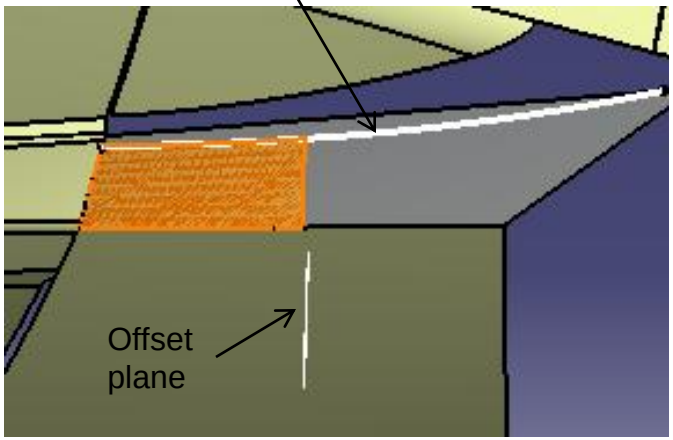
Tutorial 8D

- Create a sketch on Xz plane (Draw a spline)
- Project Sketch on the split surface

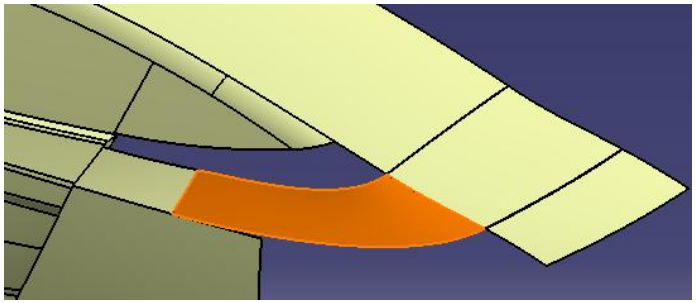


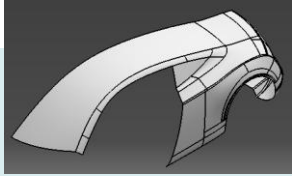


- Create an offset plane (Yz plane, 3100mm)
- Split surface by projected sketch & offset plane



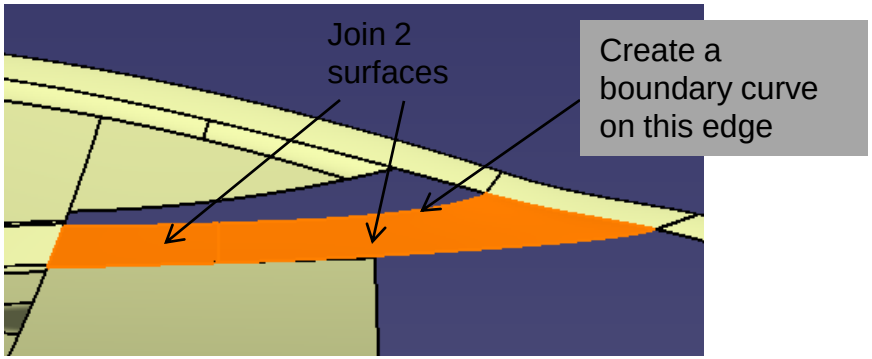
- Create a blend surface (curvature continuous)



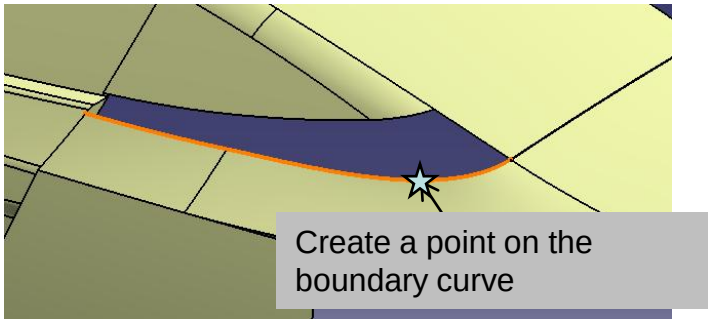


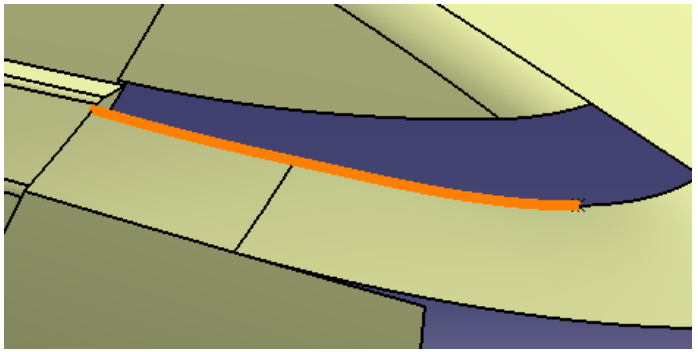
Tutorial 8D

- Join two surfaces
- Create a boundary curve

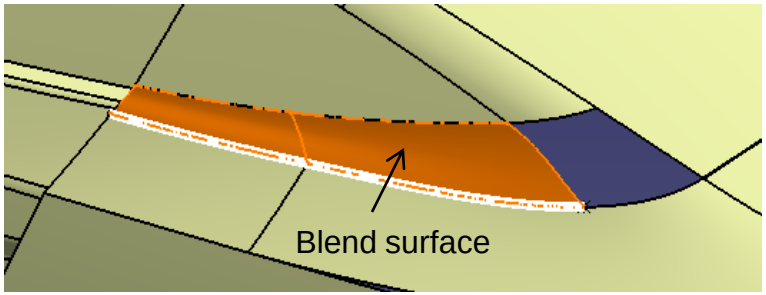


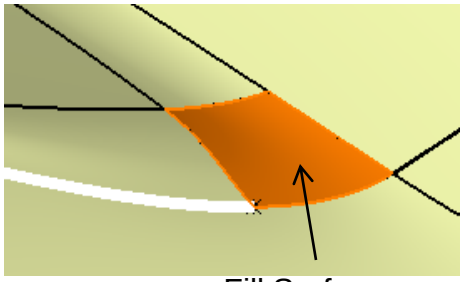
- Create a point on the boundary curve
- Split the curve by the point

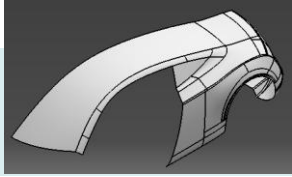




- Create a blend surface (curvature continuous)
- Create a fill surface (curvature continuous)

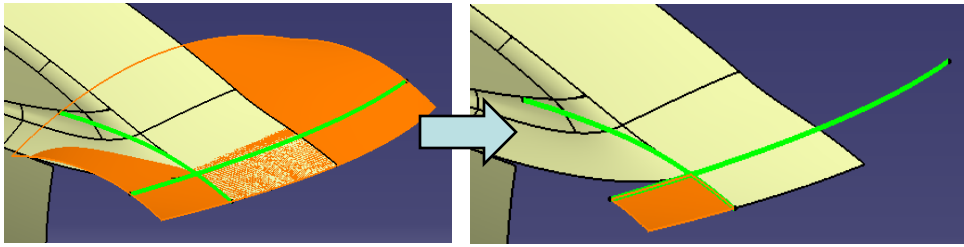




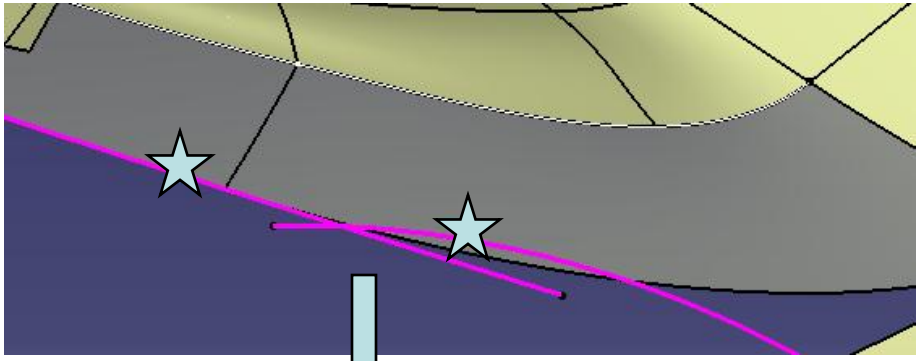


Tutorial 8D

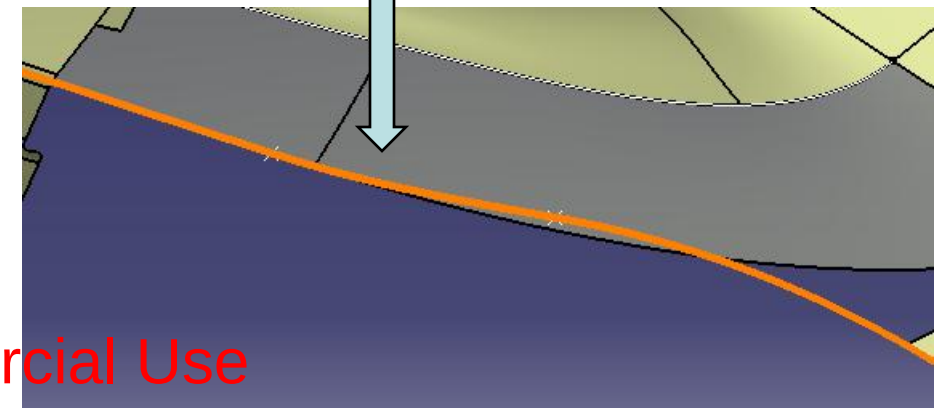
- Show the multi-sections surface (1st surface in this geometrical set)
- Show the two isoparametric curves
- Split the surface by these two curves



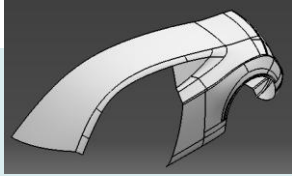
- Create a point on 3D curve ☆
- Create a point on another 3D curve ☆



- Create a connect curve between the two 3d curves (select “trim elements”)

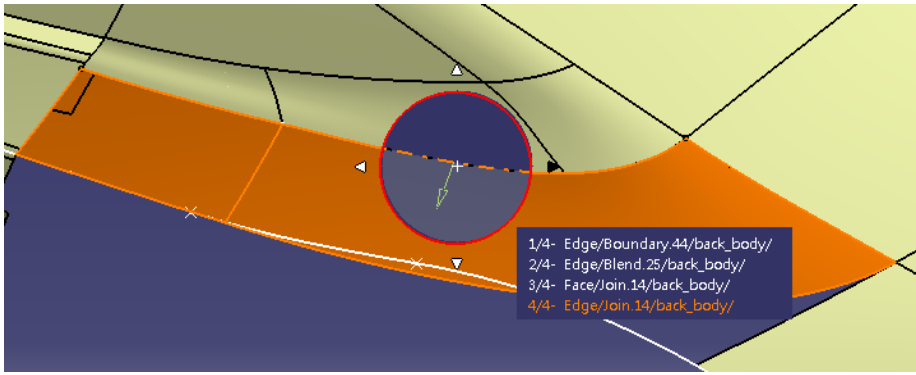


Not For Commercial Use



Tutorial 8D

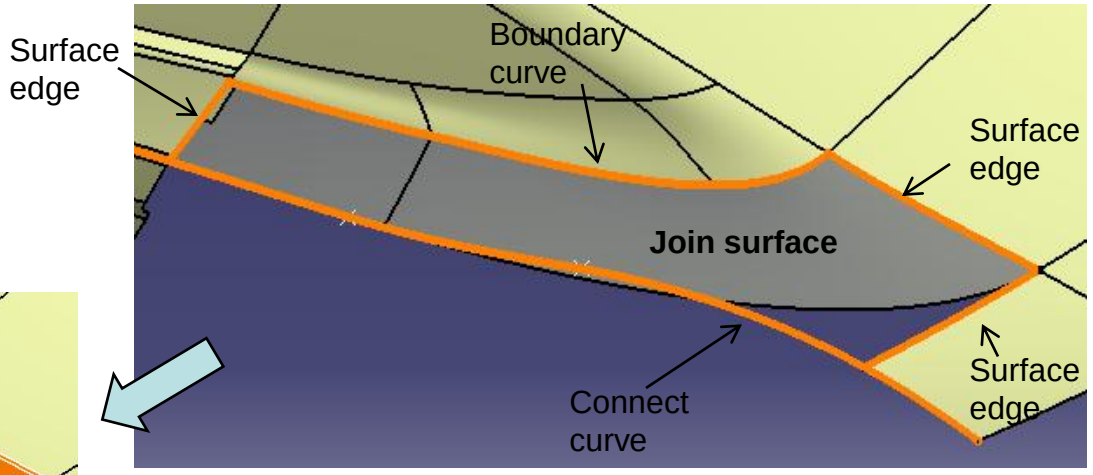
- Select an edge of the Join Surface
  (tip: move the mouse cursor on it, then press " ⇧ " key on the keyboard, so that we can select it on a selection list)

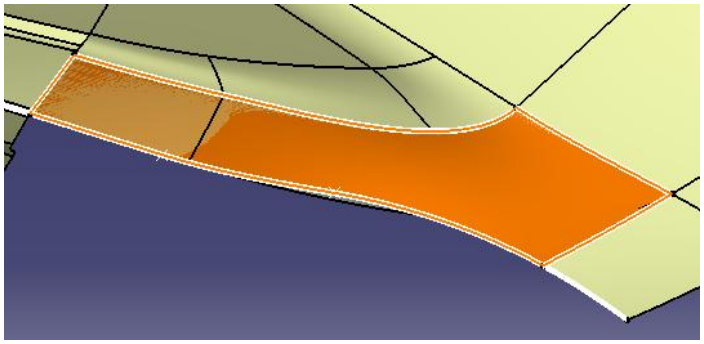


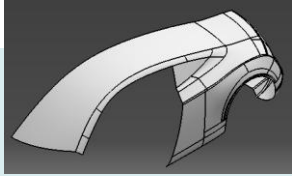
- Create a Boundary curve

- Create a Fill surface
  5 Curves / but 4 Supports

- Hide the Join Surface

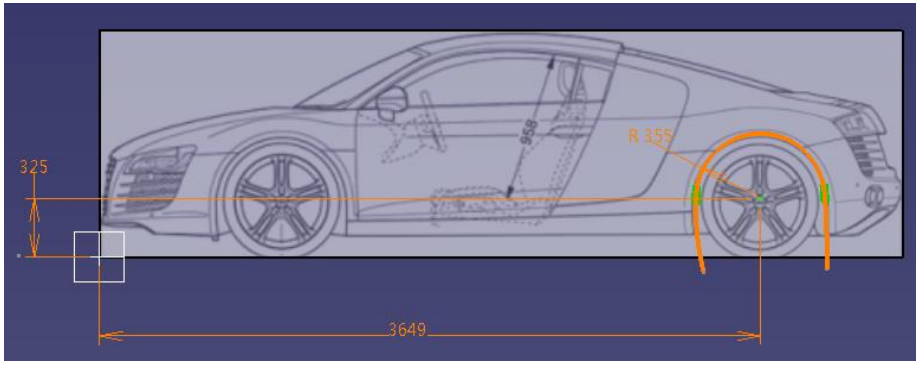






Tutorial 8D

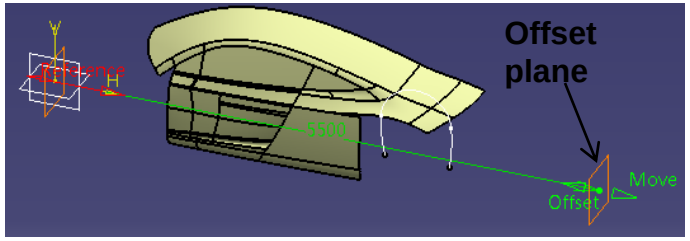
- Create a sketch (3 arcs , Dia355mm, 3649mm)

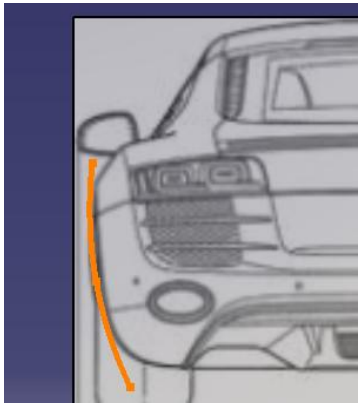


- **Create an offset plane at the back (Yz plane, 5500mm)**

- Create a sketch (Draw a spline, 3 points)

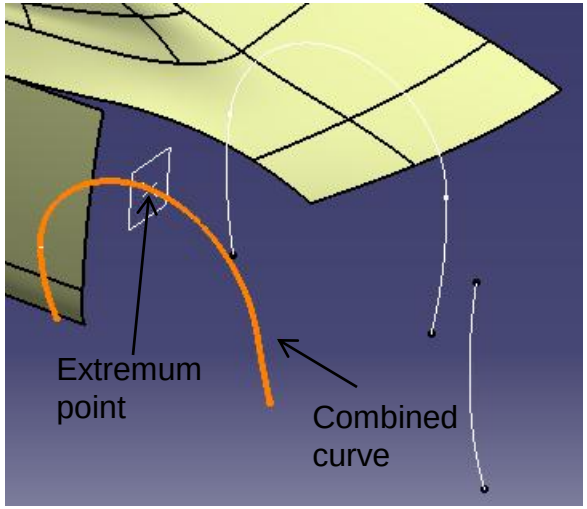
- Create a combined curve (from the above 2 sketches)

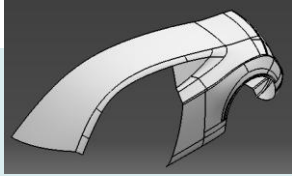




- Create a extremum point on the combined curve

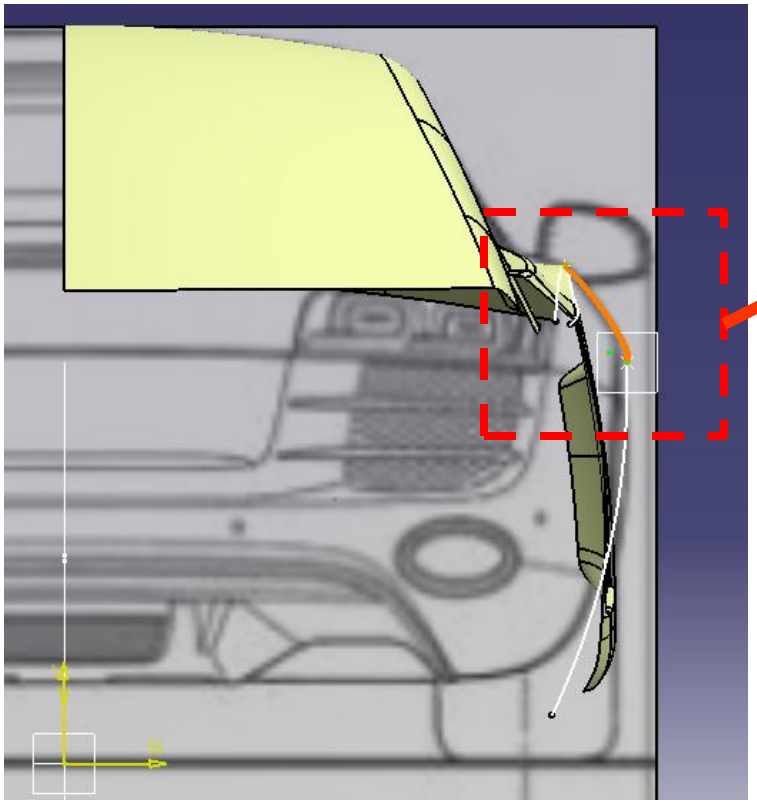
- Create a plane at the point

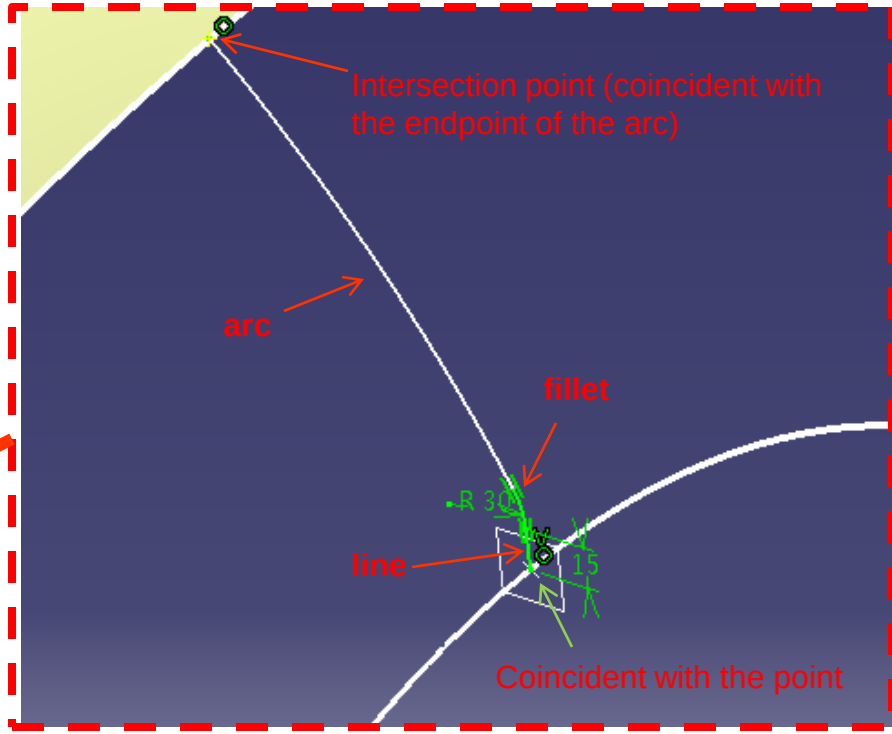


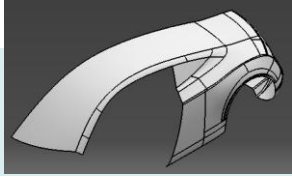


Tutorial 8D

- Create a sketch on the plane
  (Draw a line (15mm), arc, fillet R30mm)

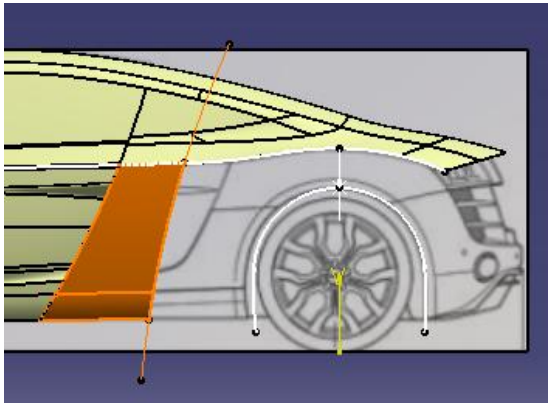


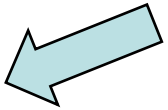


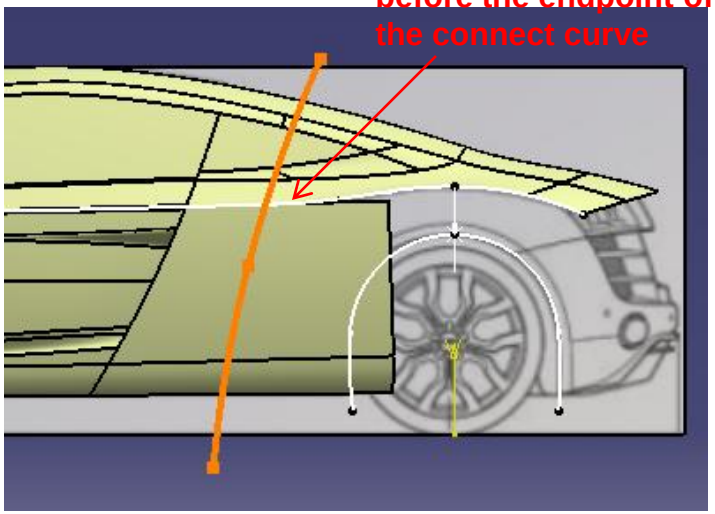


Tutorial 8D

- Create a sketch on Xz plane (Draw a spline)
- Project sketch
- Split the surface by projected sketch

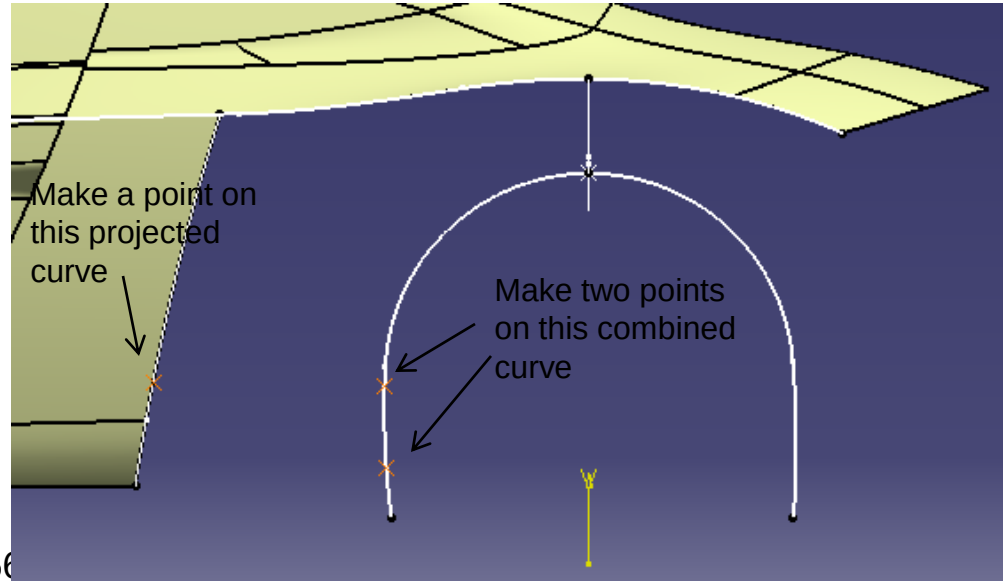


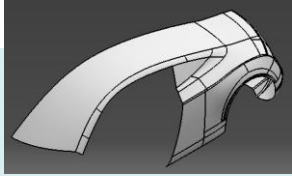




- Create 2 points on the combined curve (as shown)

- Create another point on the projected curve (as shown)

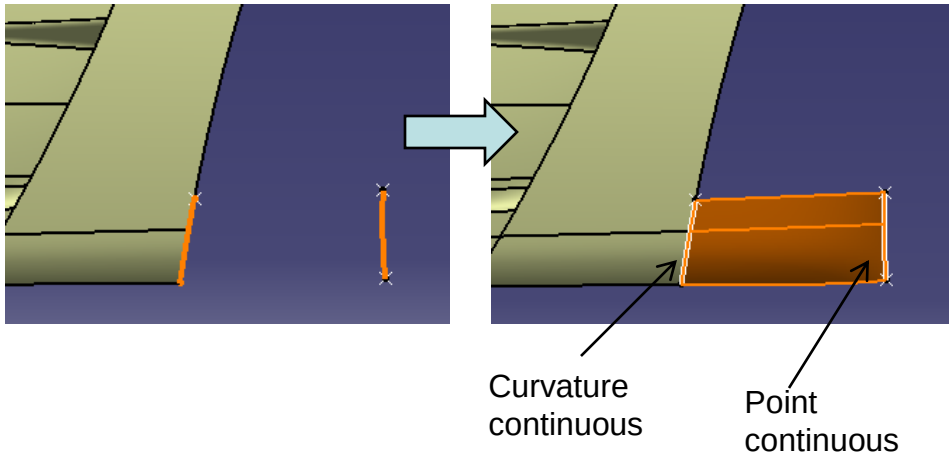




Tutorial 8D

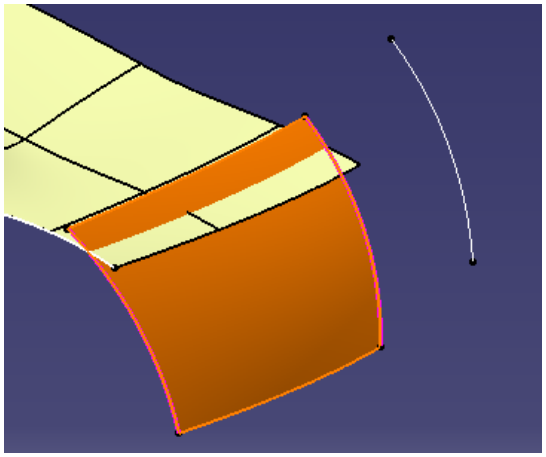
- Create a split curve by two points
- Create another split curve by one point

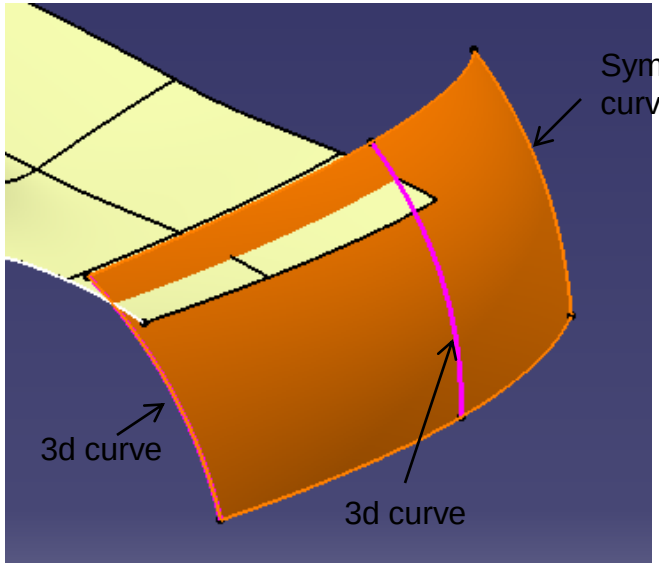
- Create a blend surface (Curvature continuous on one end, point continuous on other end)



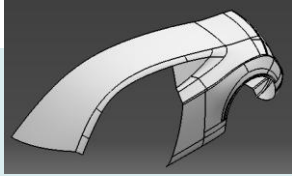
- Create a symmetry curve
- Create a multi-sections surface (3 sections)

- Split the surface by XZ plane



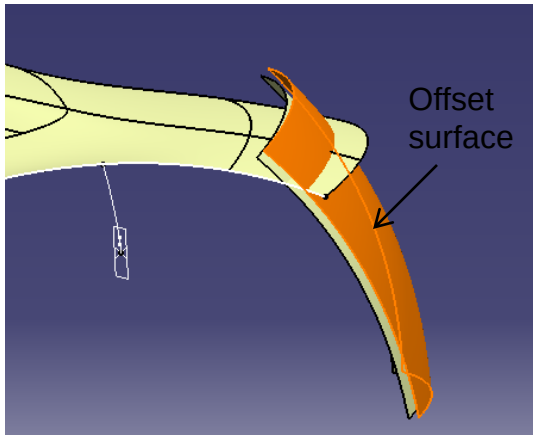


Not For Commercial Use



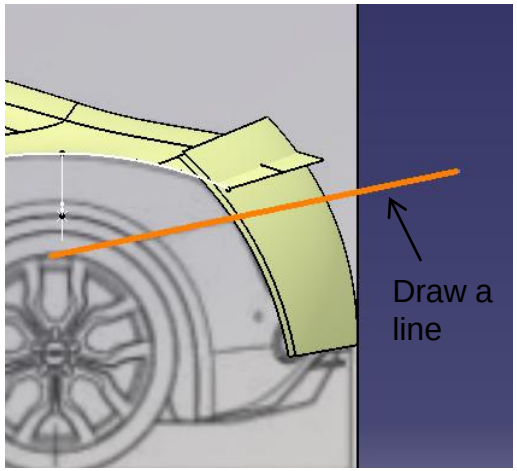
Tutorial 8D

- Create an offset surface (20mm, **outward**)

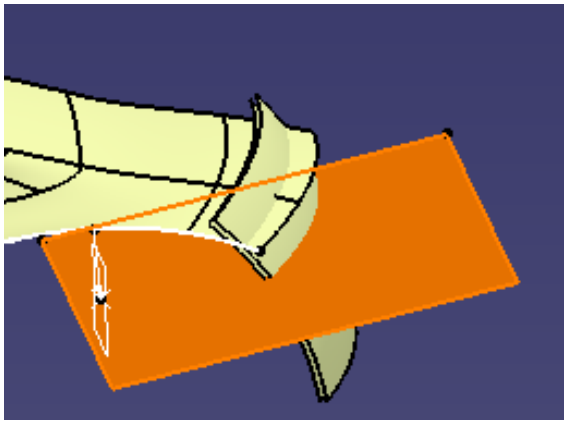


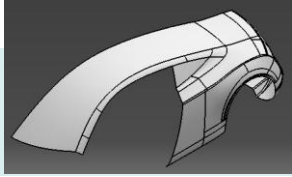
- **Right-Click Geometrical set "parting_surface", then select "Define in work object"**

- Create a sketch on XZ plane (Draw a line)



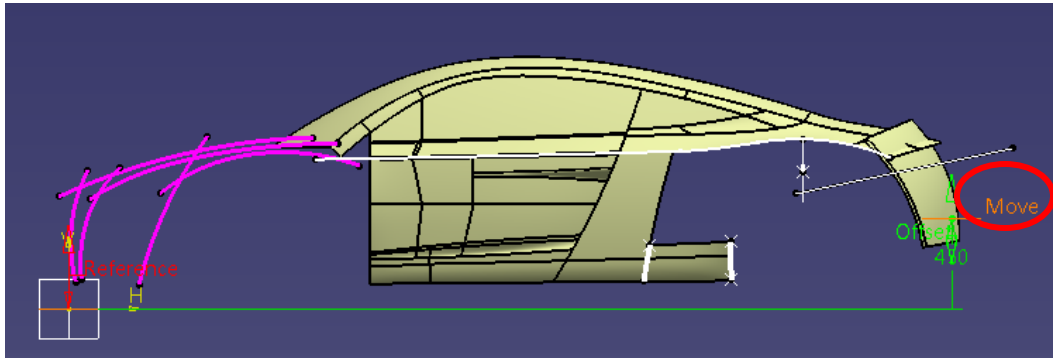
- Create an extruded surface (1500mm)





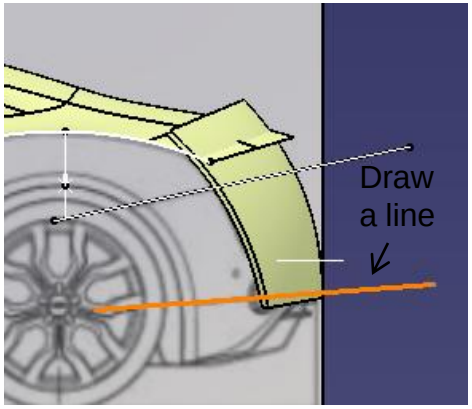
Tutorial 8D

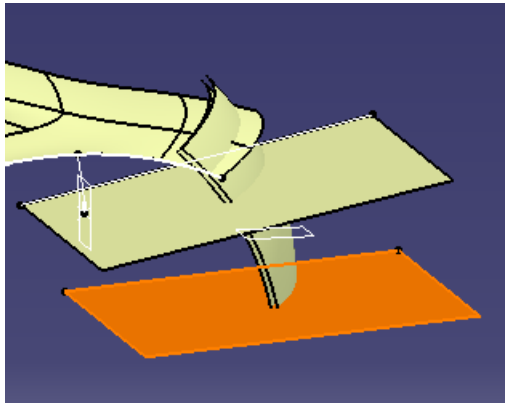
- **Right-Click geometrical set "back-body", then select "Define in work object"**



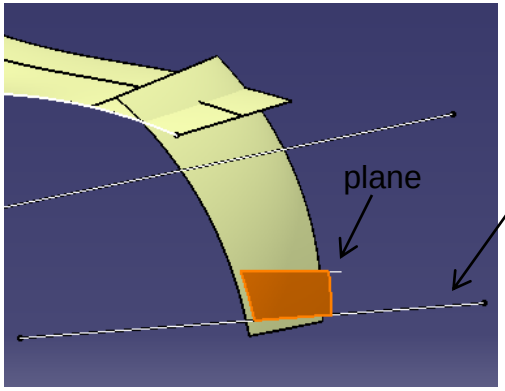
- Create an offset plane (450mm from XY plane; **"Move"** the plane near the rear surfaces)

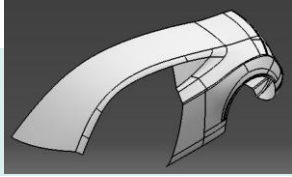
- Create a sketch on XZ plane (Draw a line)
- Create an extruded surface (1500mm)





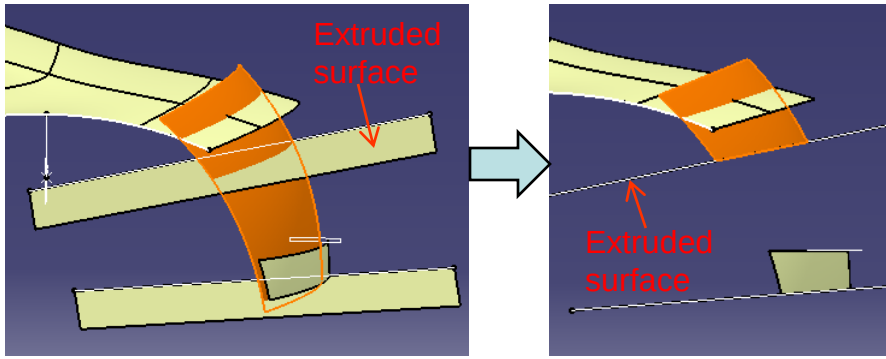
- Split the offset surface (by the plane & the extruded surface)



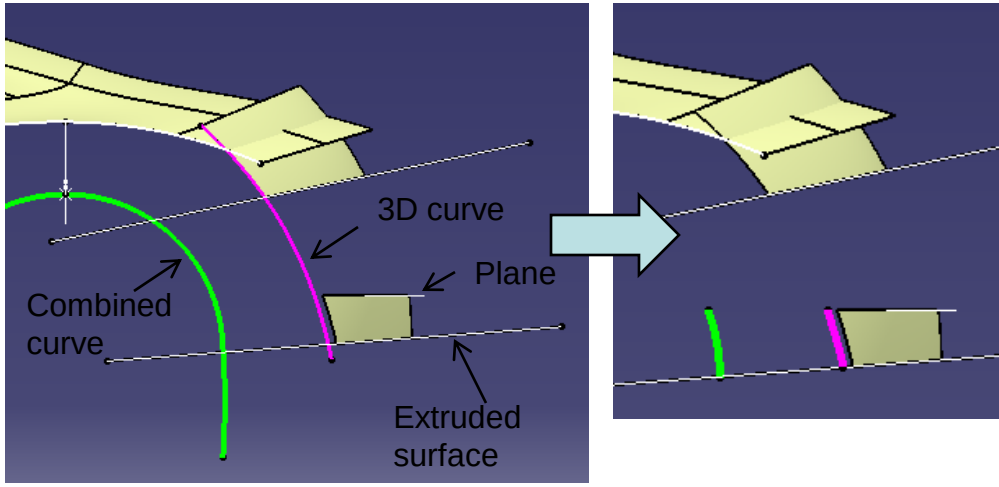


Tutorial 8D

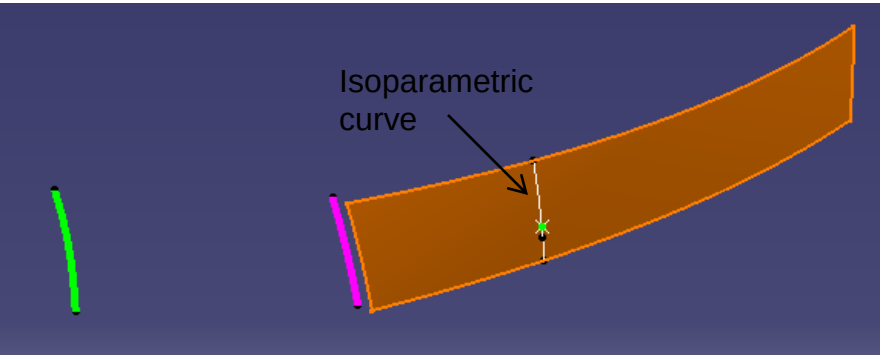
- Split surface by the Extruded Surface

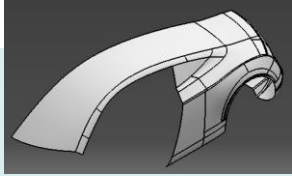


- Split the 3d curve (by a plane & an extruded surface)
- Split the combined curve ((by a plane & an extruded surface)



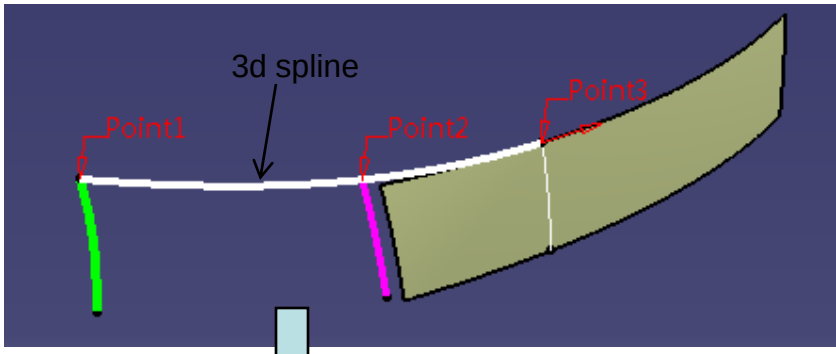
- Create a isoparametric curve



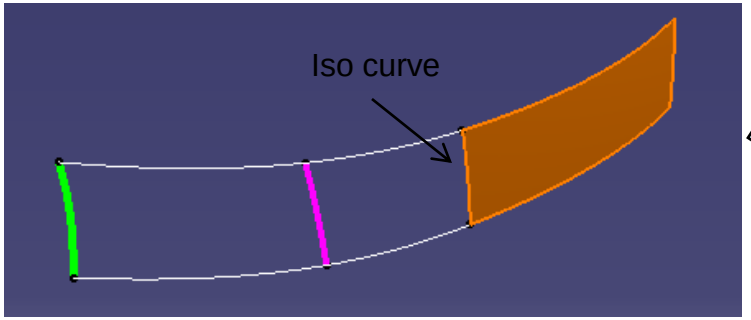


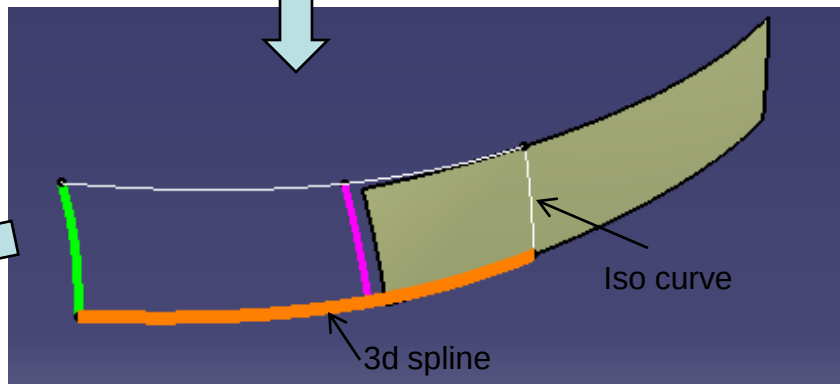
Tutorial 8D

- Create a 3d spline curve (3 points, tangent to the surface edge)

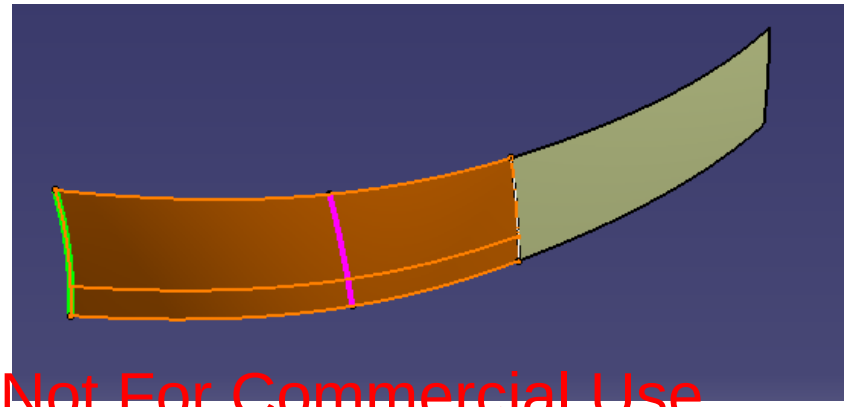


- Similarly, Create another 3d spline curve (3 points, tangent to the surface edge)
- Split surface by the iso curve

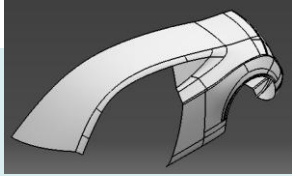




- Create a multi-sections surface
  - 3 Sections, 1 tangent support
  - 2 Guides

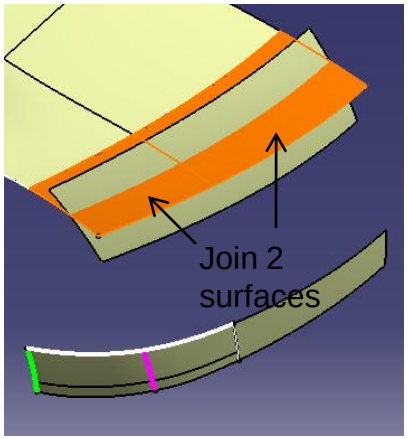


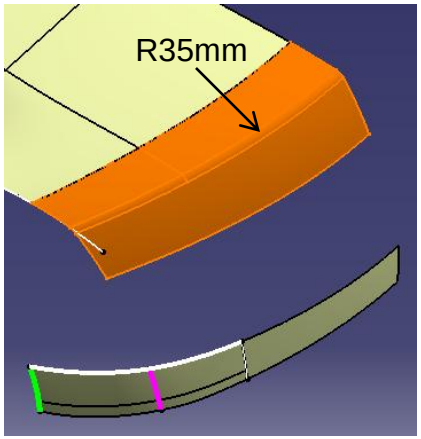
Not For Commercial Use



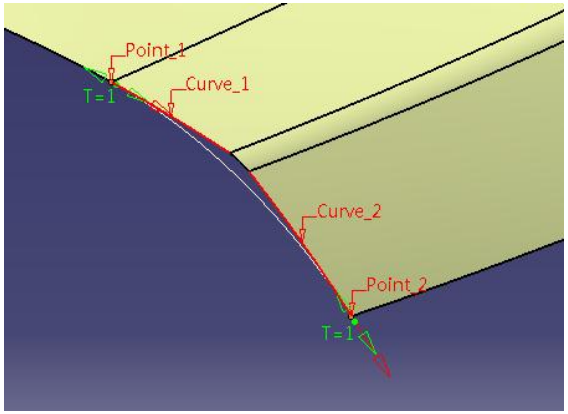
Tutorial 8D

- Join 2 surfaces
- Create a shape (surface-surface) fillet (R35mm)

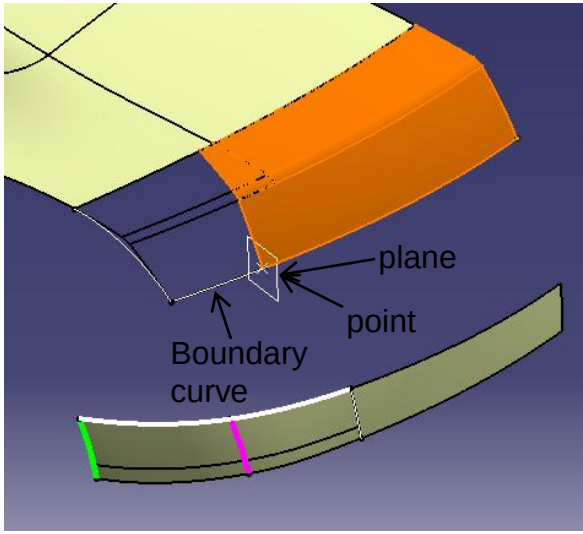


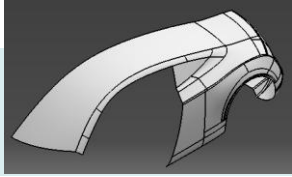


- Create a connect curve (tangent continuous on both sides)



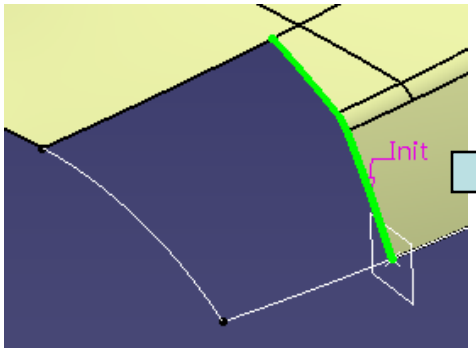
- Create a boundary curve
- Create a point on the curve
- Create a plane at the point
- Split the fillet surface by the plane

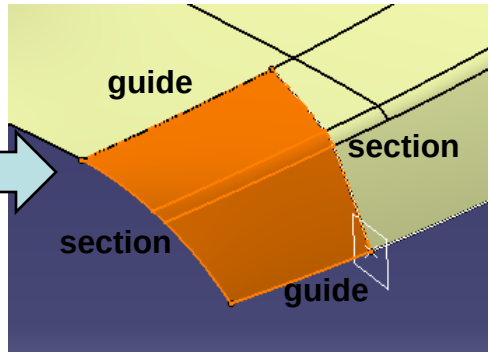




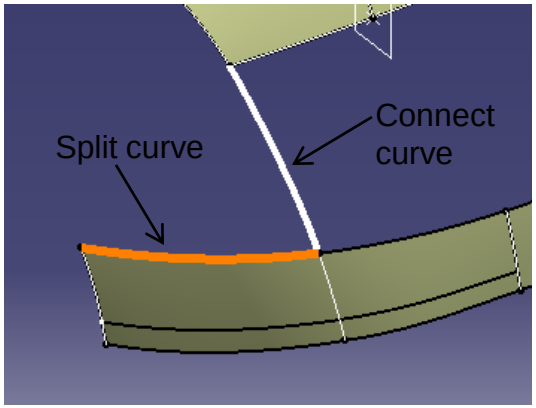
Tutorial 8D

- Create another boundary curve
- Create a multi-sections surface
  - 2 sections, 1 tangent support
  - 2 guides, 1 tangent support

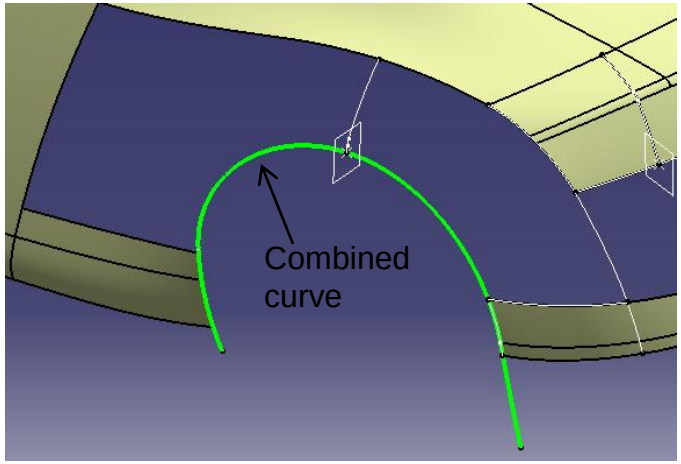


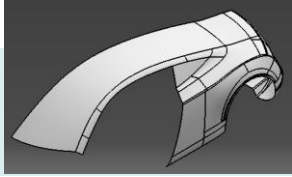


- Create a connect curve (curvature continuous on both sides)
- Split the curve/edge by this connect curve



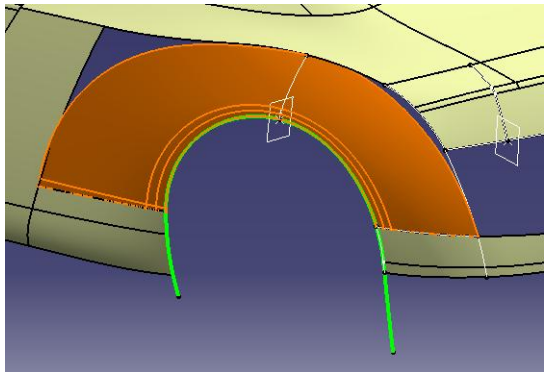
- Show the combined curve



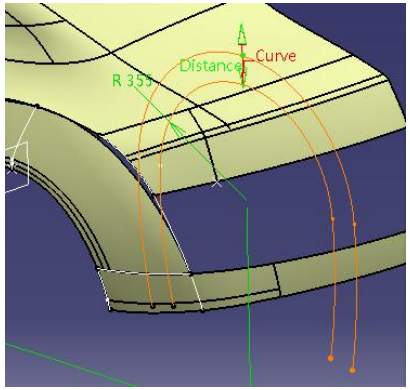


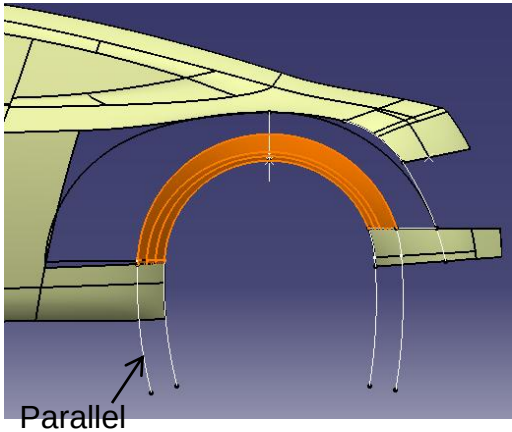
Tutorial 8D

- Create a multi-sections surface
  - 3 Sections, 2 tangent supports
  - 1 guide

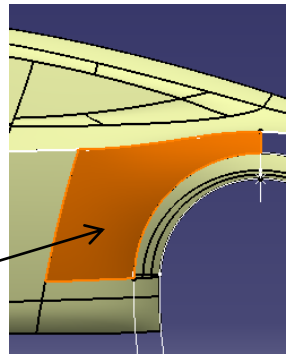


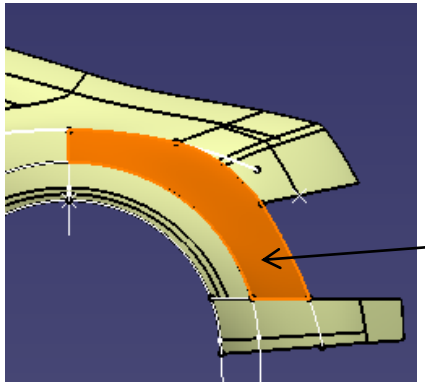
- Create a parallel curve (~80mm offset from the sketch on XZ plane)
- Project curve onto the multi-sections surface
- Split surface

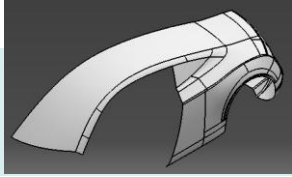




- Create a fill surface (curvature continuity)
- Create a fill surface (curvature continuity)

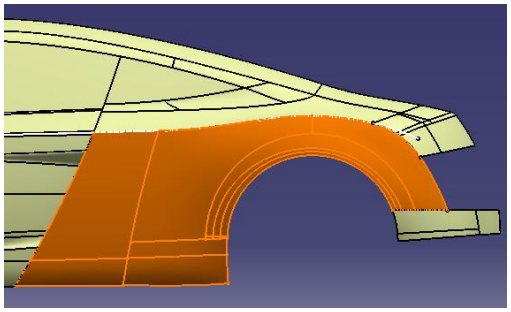




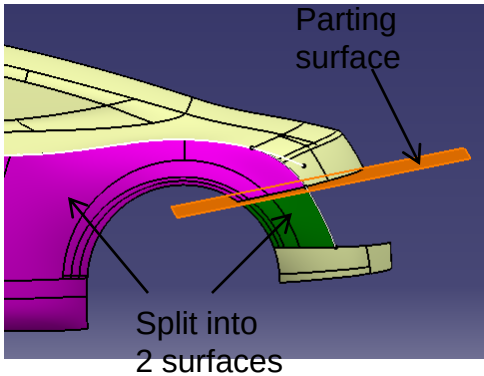


Tutorial 8D

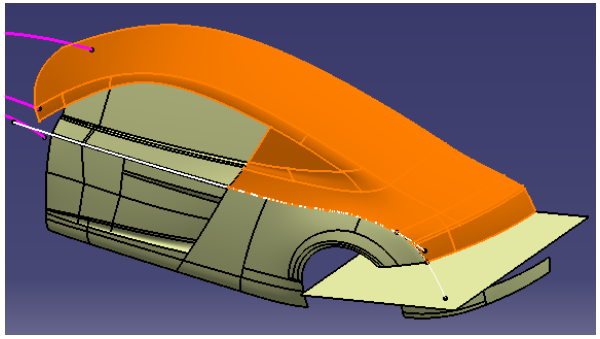
- Join surfaces (as shown)



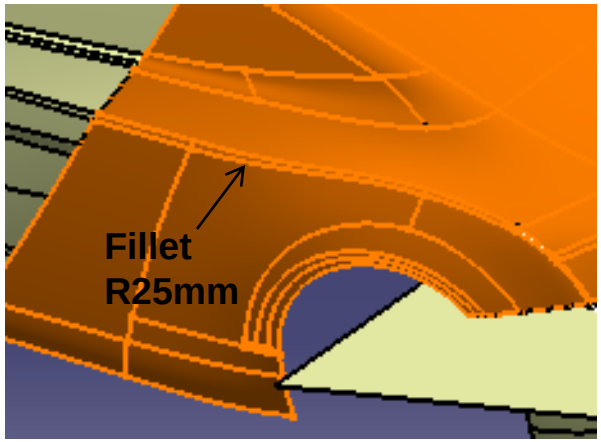
- Split the surface **into 2** (by a parting surface)

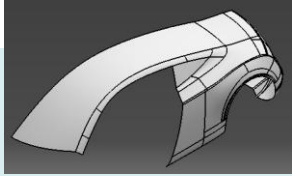


- Join (top) surfaces (as shown)



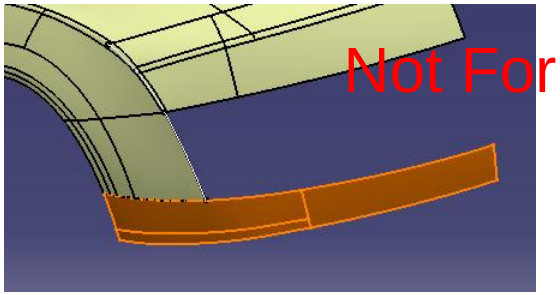
- Create a shape fillet (surface-surface) (R25mm)

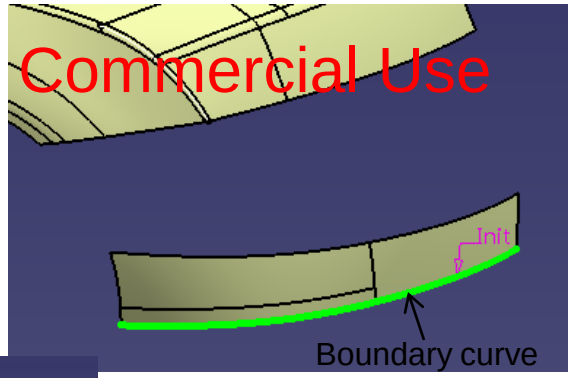




Tutorial 8D

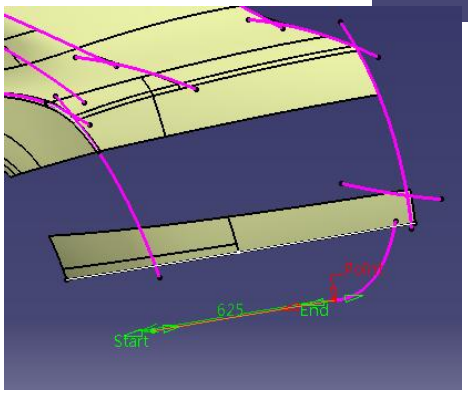
- Join surfaces
- Create a boundary curve



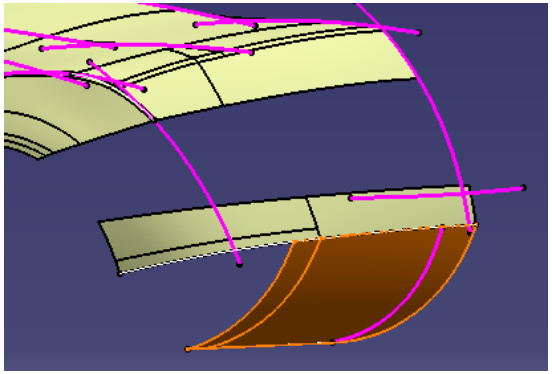


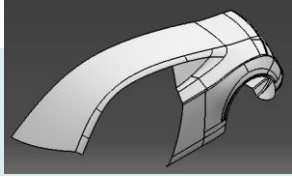
Not For Commercial Use

- Create a line (625mm, from end point of the 3d curve; direction: Xz plane)



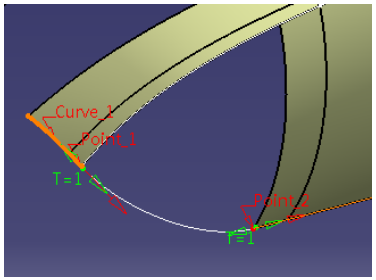
- Create a swept surface
  - Profile Type: Circular
  - Subtype: Two guides & radius
  - Select the boundary curve as guide1
  - Select the line as guide 2
  - Radius =450mm
  - Select the line as the spine

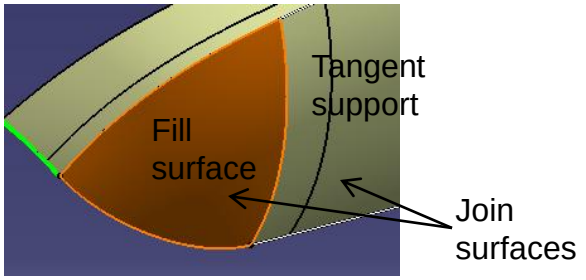




Tutorial 8D

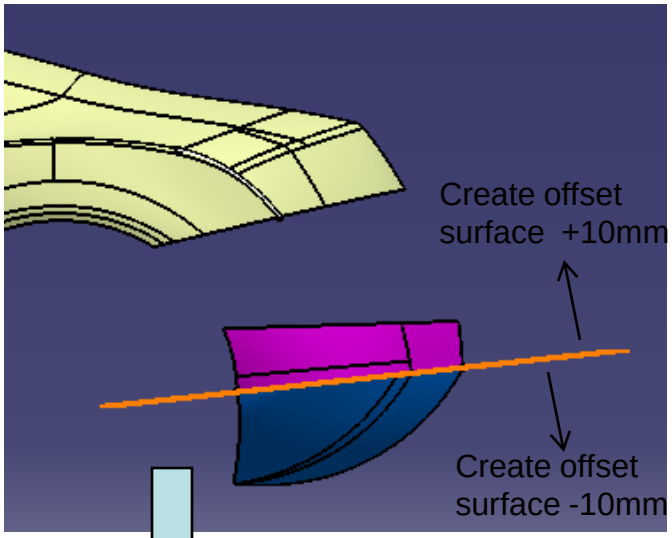
- Create a connect curve
- Create a fill surface
  (3 edges, 1 tangent support)



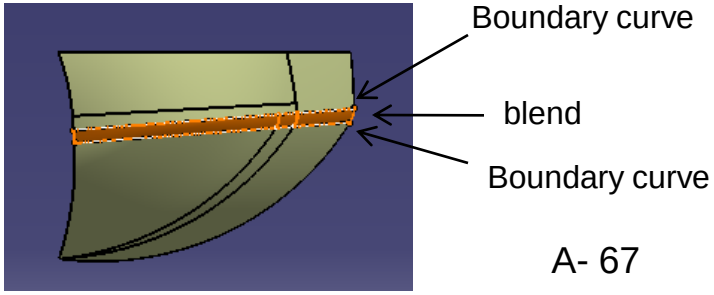


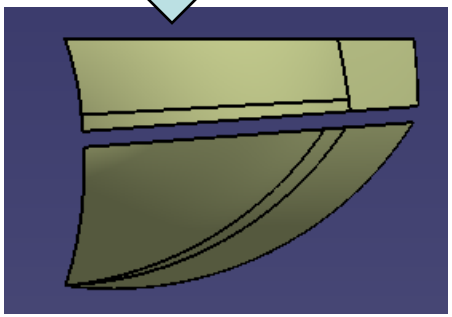
- Join two surfaces

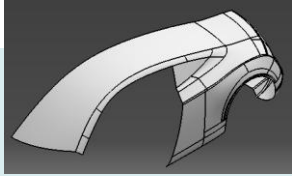
- Create an offset surface (10mm)
- Create an offset surface (-10mm)
- Split Upper Join surface by the upper offset surface
- Split Lower Join surface by the lower offset surface



- Create a boundary curve
- Create a boundary curve
- Create a blend surface
  (tangent continuous on both sides)

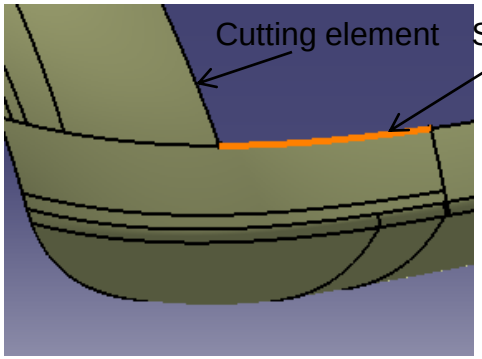




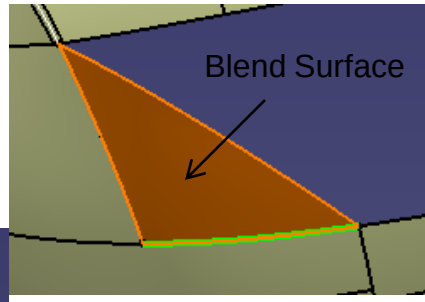


Tutorial 8D

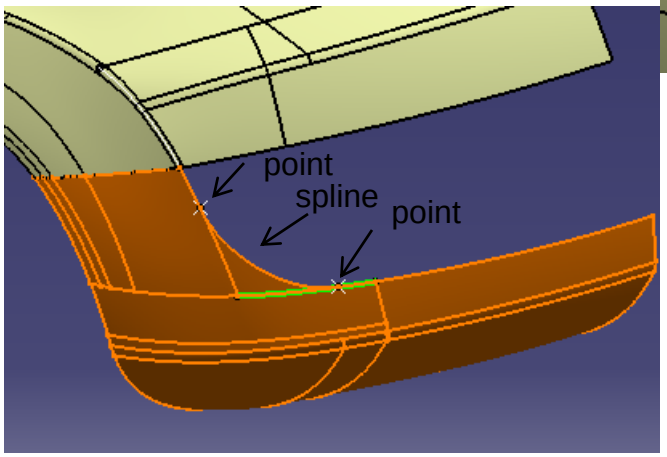
- Create a split curve



- Create a blend surface (curvature continuous, tangent borders – none)

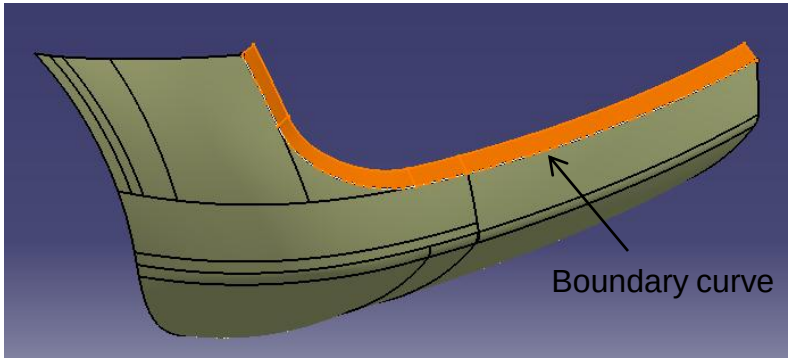


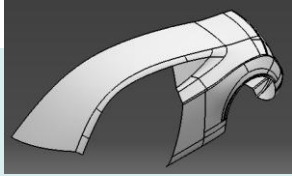
- Create a point on curve
- Create a point on curve
- Create a spline (on surface, tangent)
- Split surface by the spline



- Join surfaces

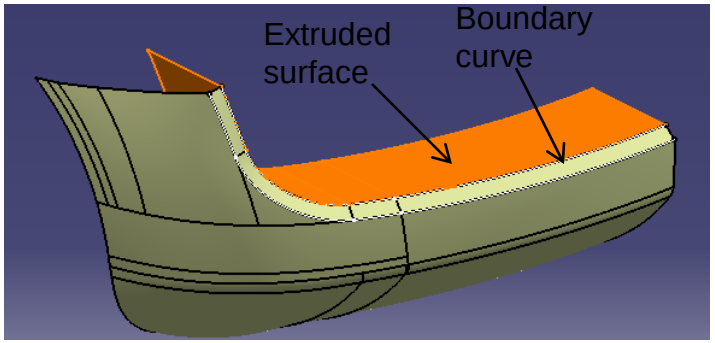
- Create a boundary curve
- Create a swept surface
  - Profile type = linear
  - Subtype = with reference surface
  - Angle = 45deg
  - Length = 30mm



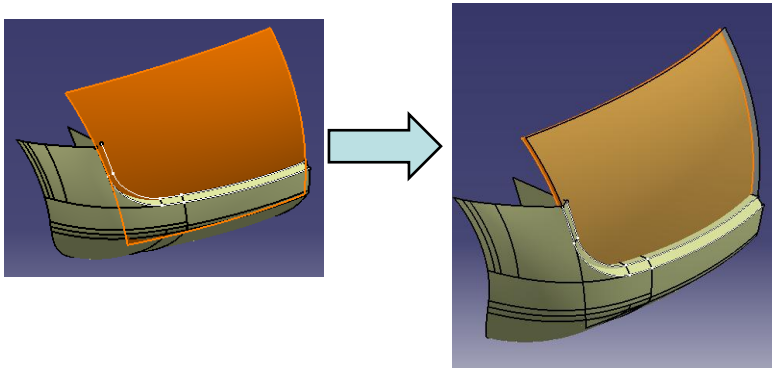


Tutorial 8D

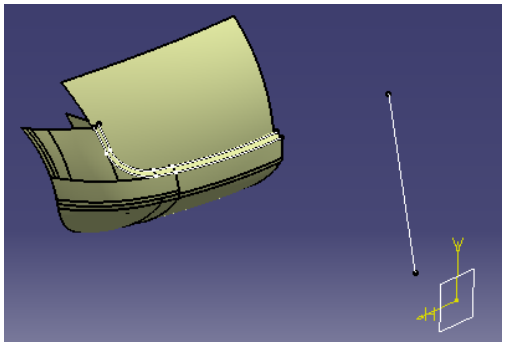
- Create another boundary curve
- Create an extruded surface (170mm, direction: Yz plane)

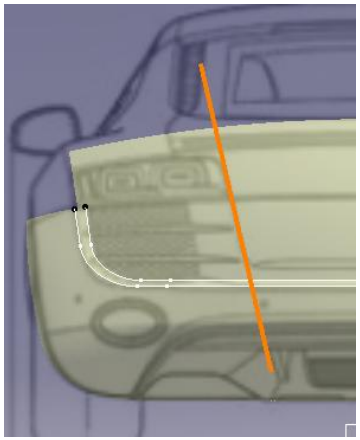


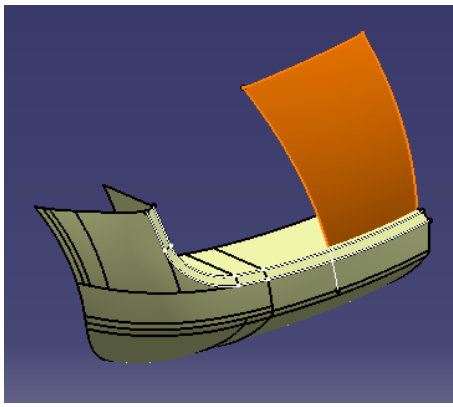
- Show the old split surface
- Create an offset surface (20mm inward)



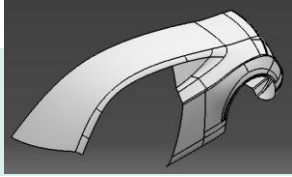
- Create a sketch on the back offset plane (Draw a line)
- Project sketch onto the offset surface
- Split surface





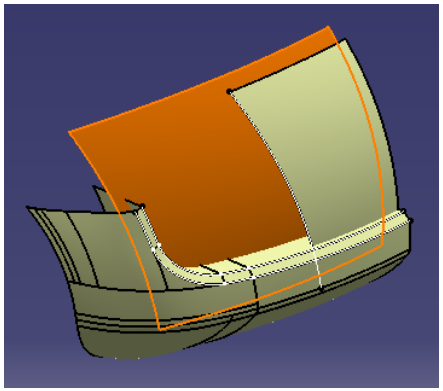


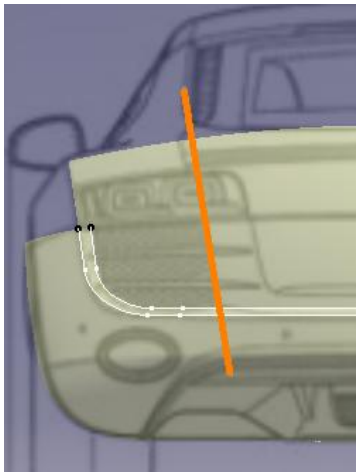
Non-Commercial Use



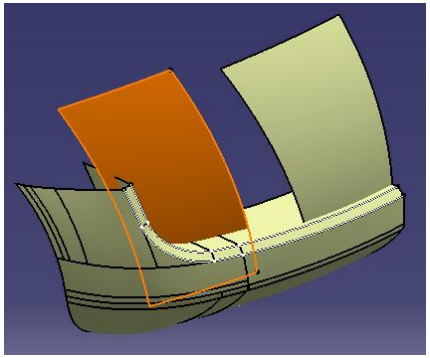
Tutorial 8D

- Translate the Untrimmed offset surface (75mm inward)

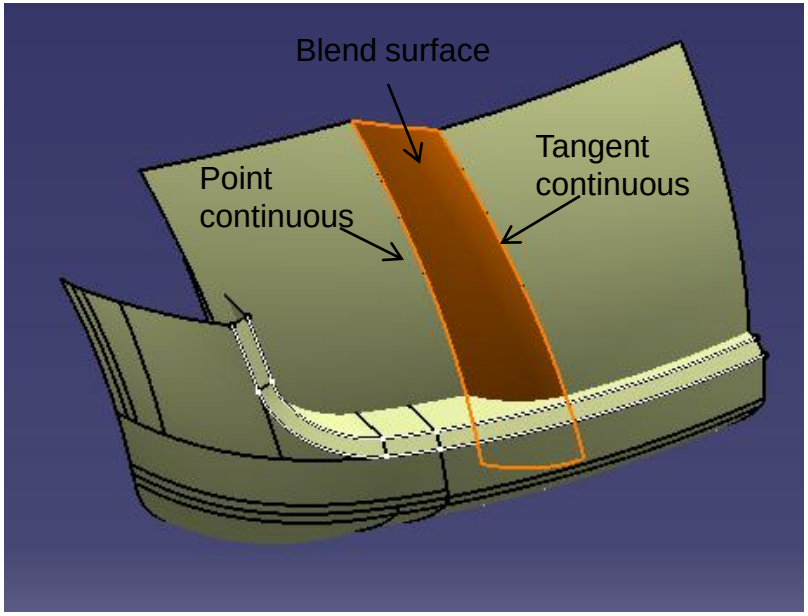


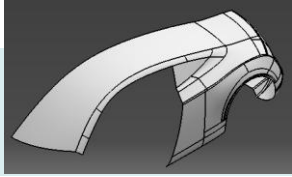


- Create a sketch on the back offset plane (Draw a line)
- Project sketch onto the new surface
- Split surface



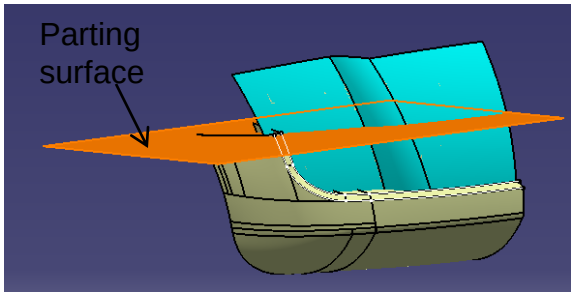
- Create a blend surface
  - Point continuous on one side, tangent continuous on other side
  - Trim support (Join them together)

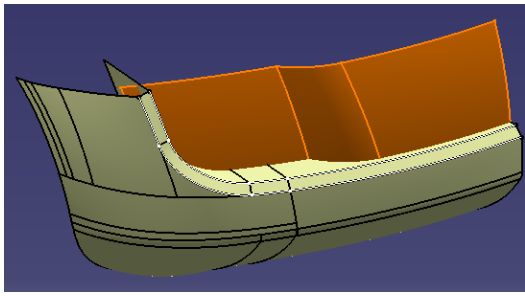




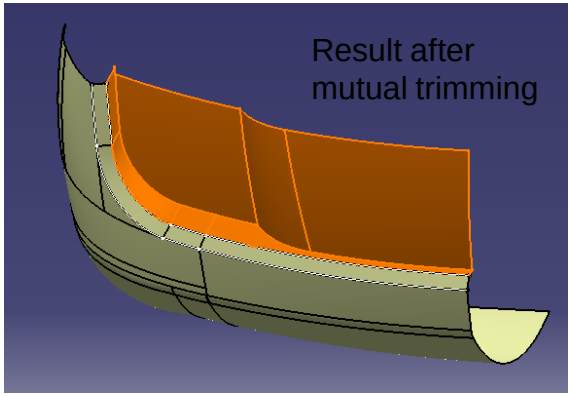
Tutorial 8D

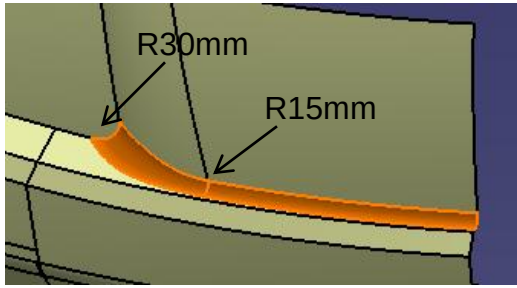
- Split surface by the old parting surface (which is in geometrical set “parting_surface”)



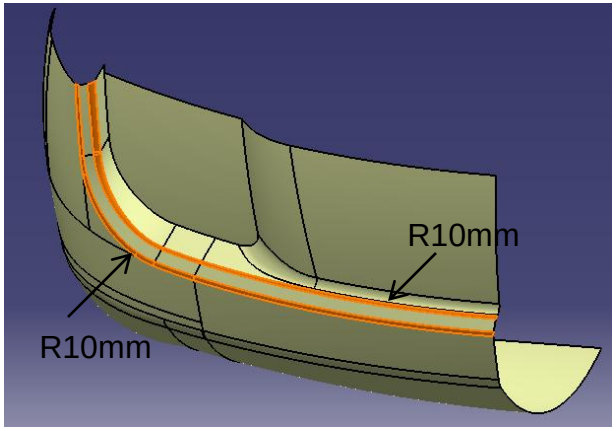


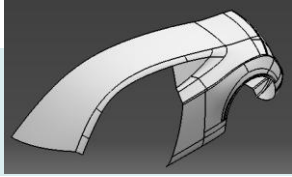
- Mutual trim surfaces





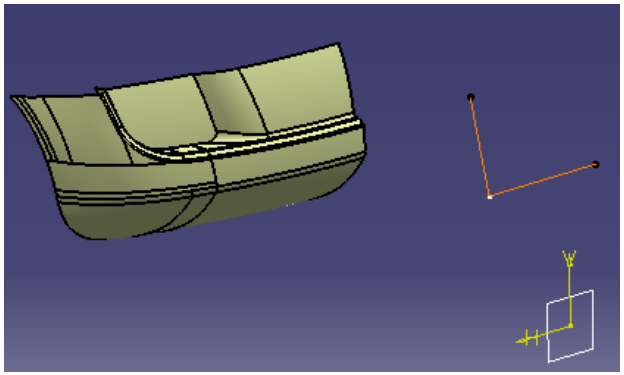
- Edge variable fillet (30mm, 15mm)
- Shape Fillet (Surface-surface 10mm)
- Shape Fillet (Surface-surface 10mm)

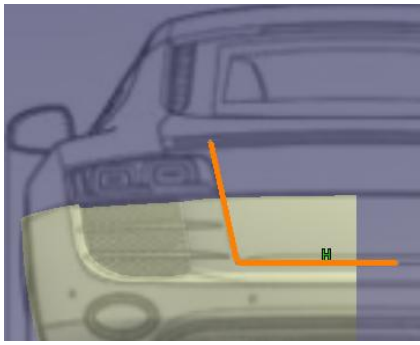


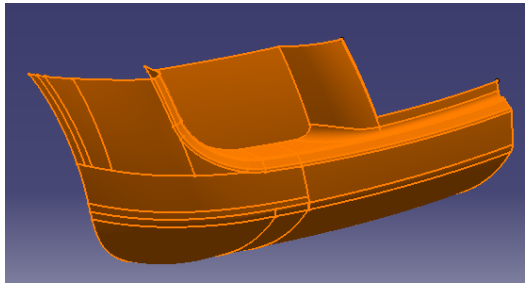


Tutorial 8D

- Create a sketch on the back offset plane (Draw 2 lines)
- Project sketch
- Split surface by projected curve

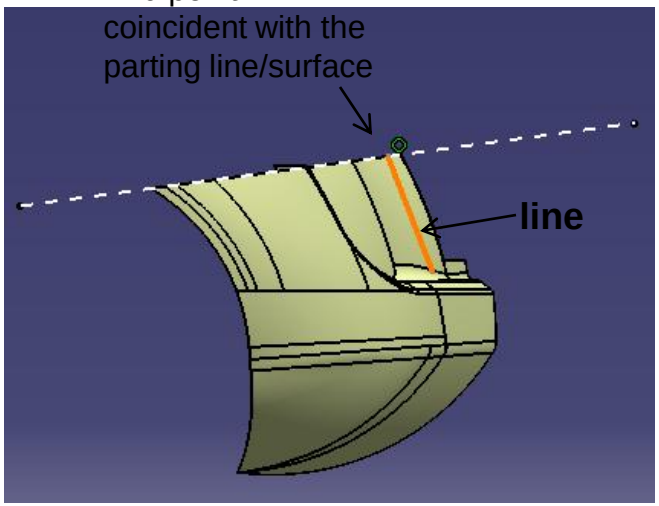




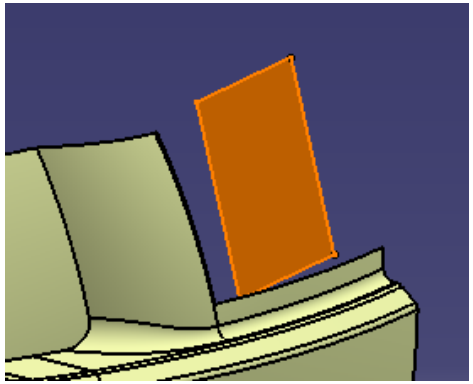


- Create a sketch on XZ plane (Draw a line)

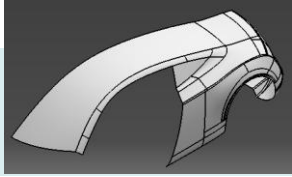
End point coincident with the parting line/surface



- Create an extruded surface (230mm)



Not For Commercial Use

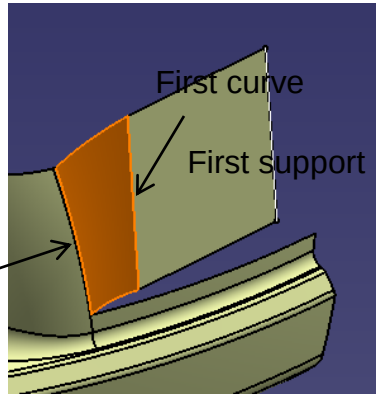


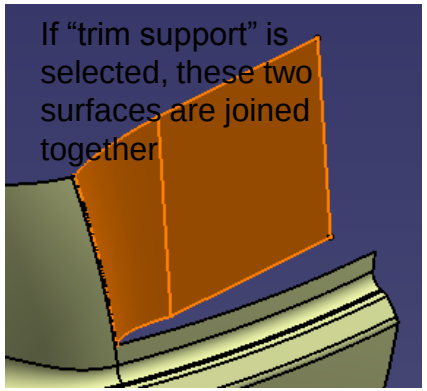
Tutorial 8D

- Create a Blend surface

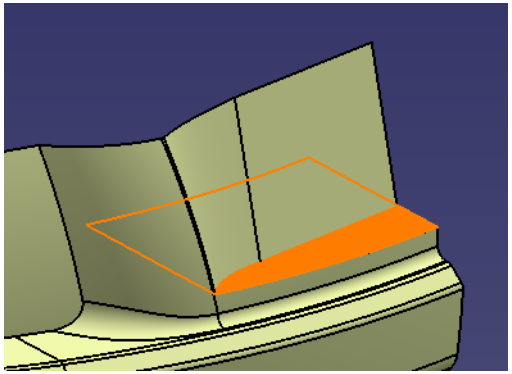
  - First curve, first support, Curvature continuous, "Trim support"

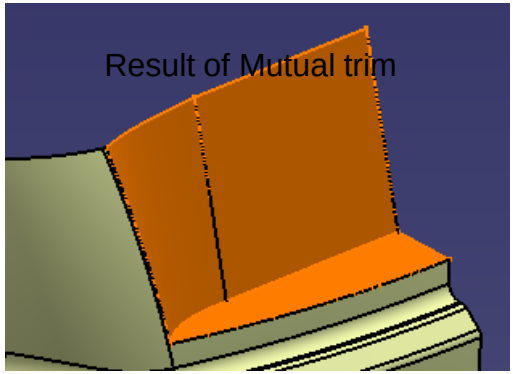
  - Second curve

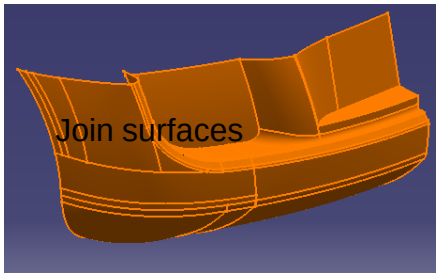


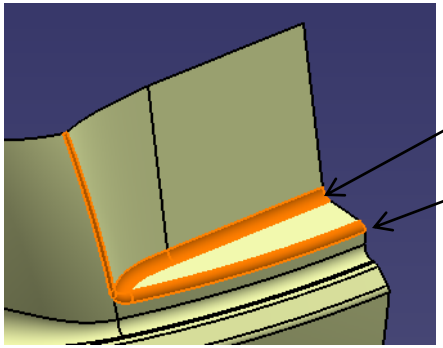


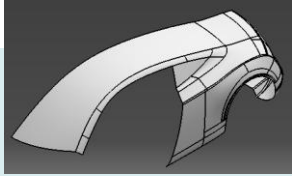
- Create an extrude surface (230mm, Direction: Yz plane)
- Mutual trim surfaces
- Join surfaces
- Edge fillet 15mm
- Edge fillet 10mm





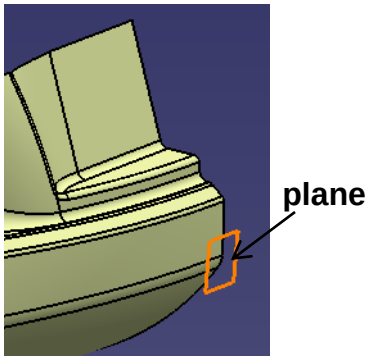


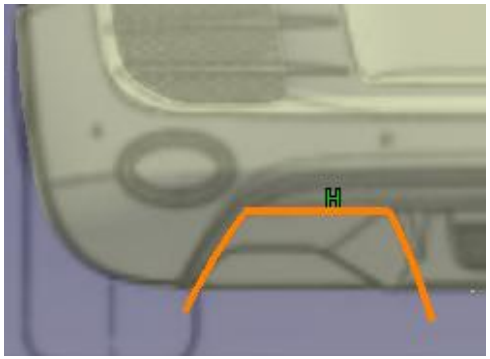




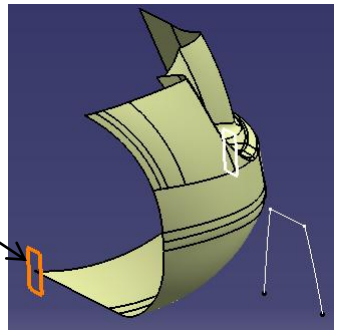
Tutorial 8D

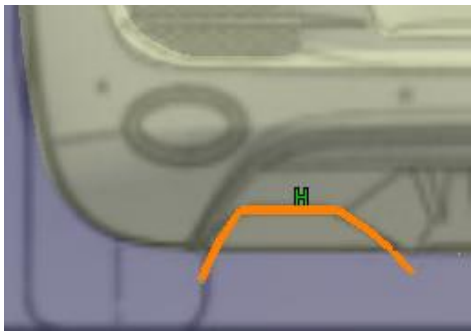
- Create a plane at an endpoint (Reference: YZ plane)
- Create a sketch on the plane



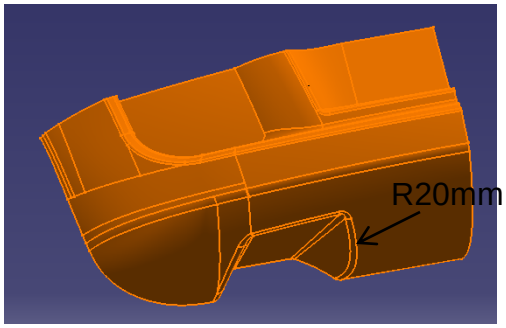


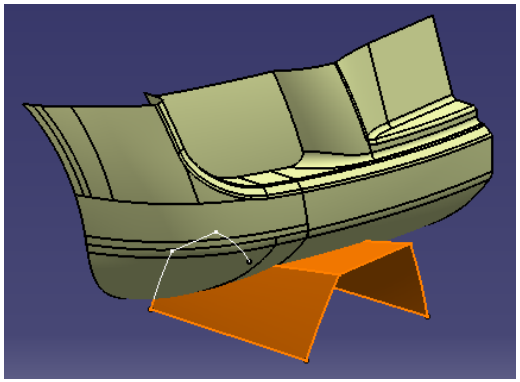
- Create another plane at an endpoint (Reference: YZ plane)
- Create a sketch

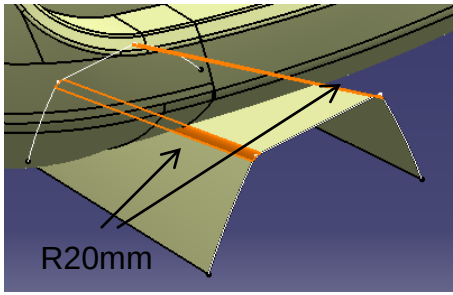




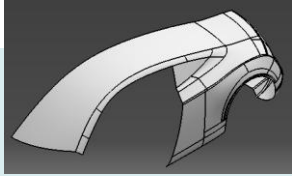
- Create a multi-sections surface (select “vertices coupling”)
- Create an edge fillet (20mm)
- Create a Shape fillet (surface-surface 20mm)







Non-Commercial Use

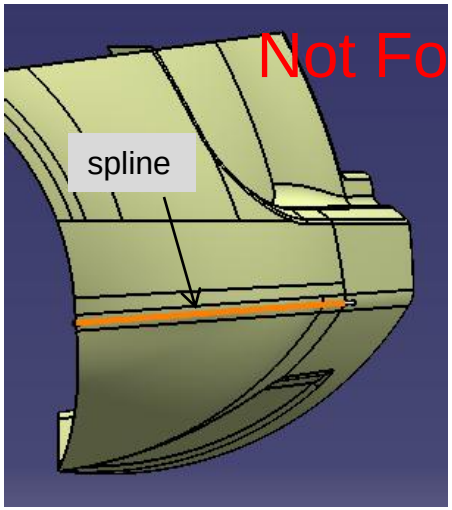


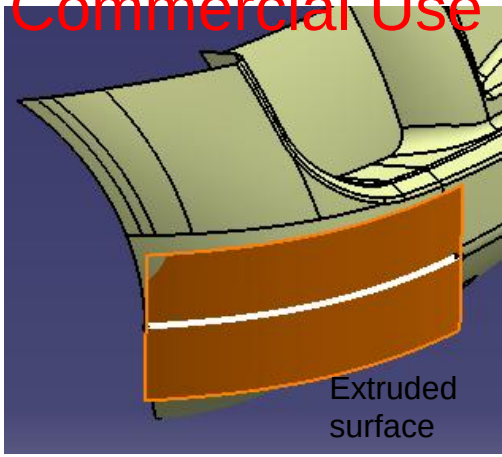
Tutorial 8D

Not For Commercial Use

- Create a parallel curve
  (Reference curve: 3d spline; Offset: 10mm)

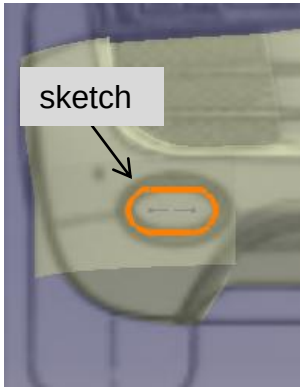
- Create an extruded surface
  - Profile: the parallel curve
  - Direction: XY plane
  - Limit 1 = 100mm ; Limit 2 =100mm

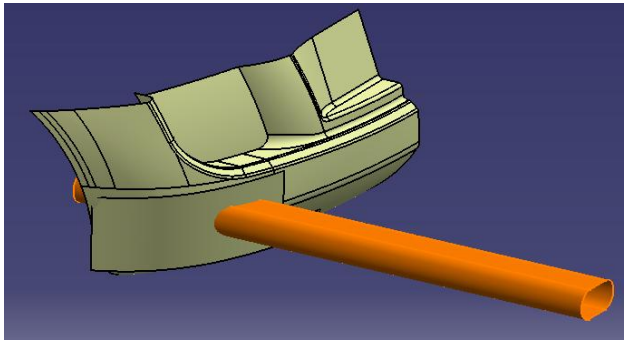


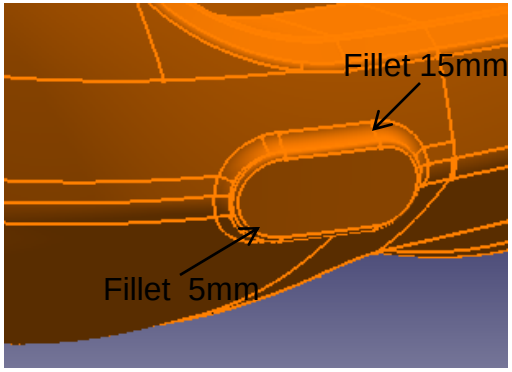


- Create a sketch on the back offset plane

- Extrude the sketch (1500mm)
- Create a Shape fillet (surface-surface, 5mm)
- Create a Shape fillet (surface-surface, 15mm)

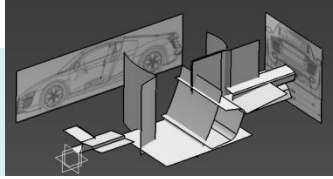






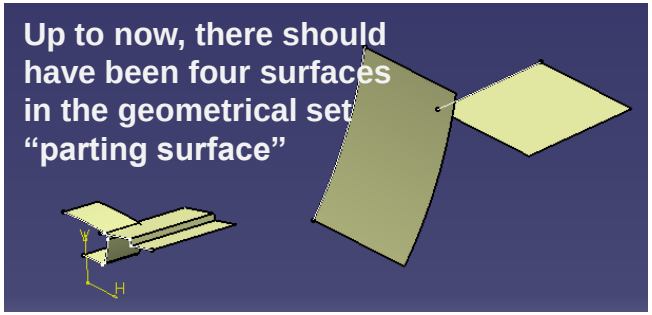
Parting Surfaces (master)

Tutorial 8D

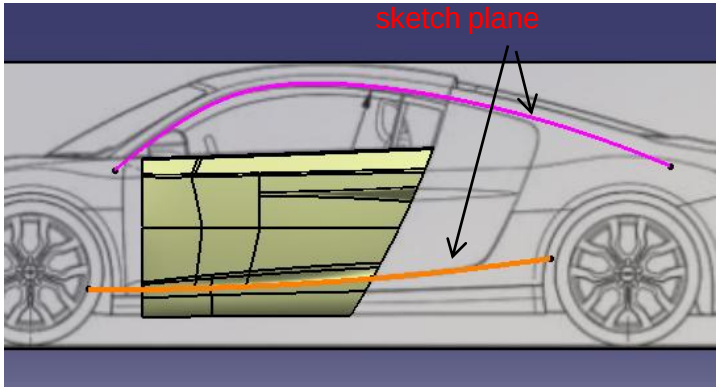


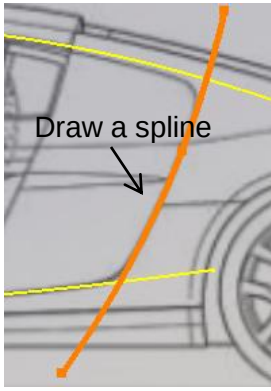
Right Click Geometrical set "parting_surface", select "Define in work object"

(Continue to make the rest…)

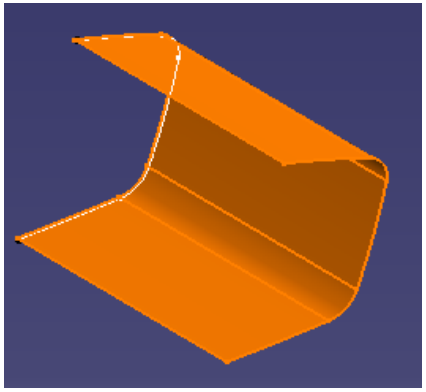


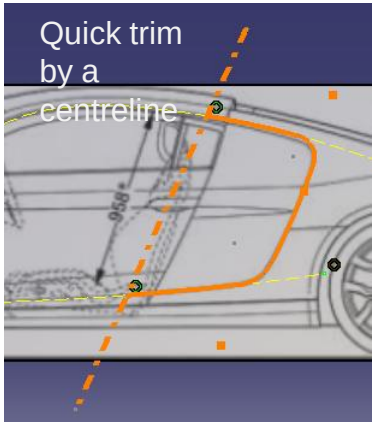
- Create a sketch on XZ plane
  - Project two 3d curve onto the plane
  - Project the old sketch onto the plane
  - Draw a spline
  - Create two fillets
  - Create a centreline, then quick-trim

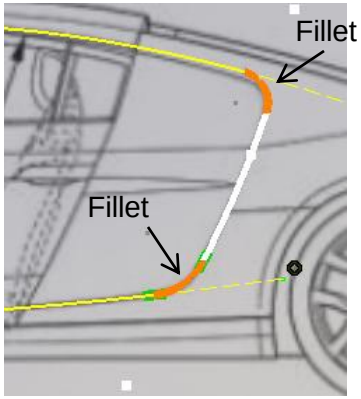




- Create an extruded surface (1800mm)



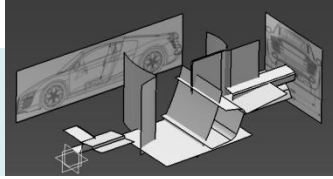




Non-Commercial Use

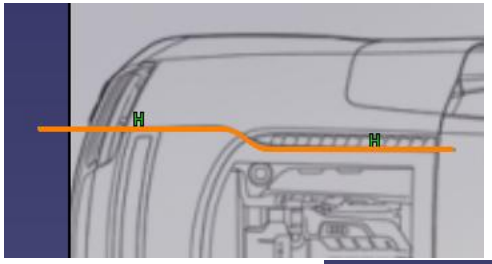
Parting Surfaces (master)

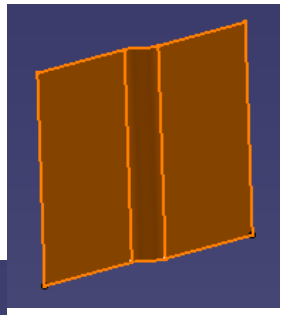
Tutorial 8D



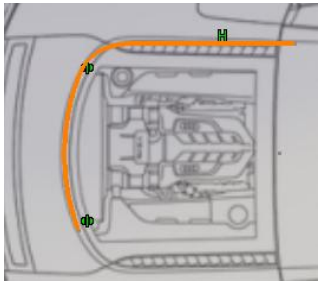
again

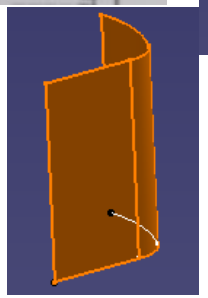
- Create a sketch on XY plane
- Create an extruded surface



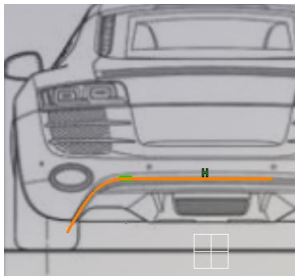


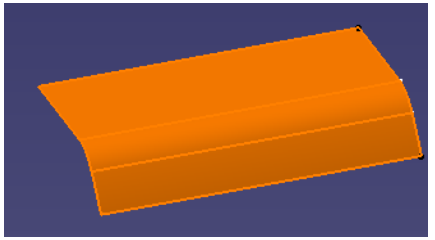
- Create a sketch on XY plane
- Create an extruded surface



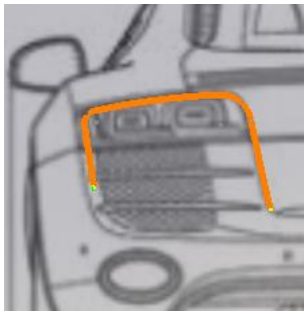


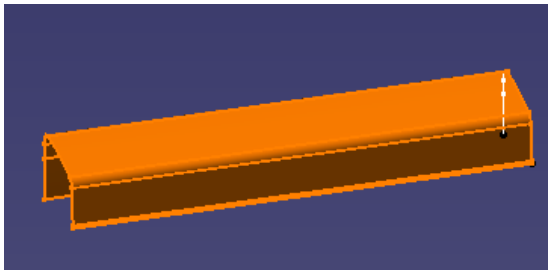
- Create a sketch on the **offset plane at back**
- Create an extruded surface





- Create a sketch on the **offset plane at back**
- Create an extruded surface

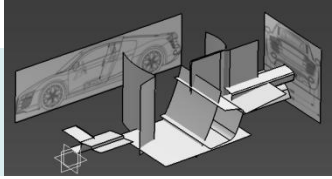




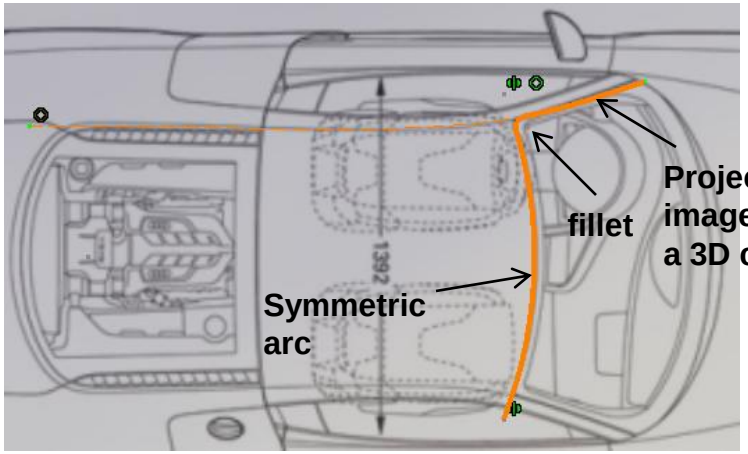
Non-Commercial Use

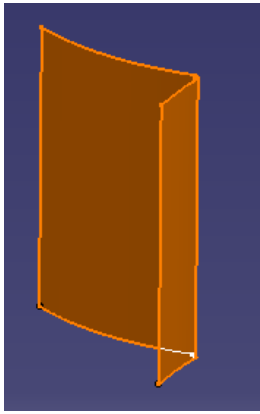
Parting Surfaces (master)

Tutorial 8D

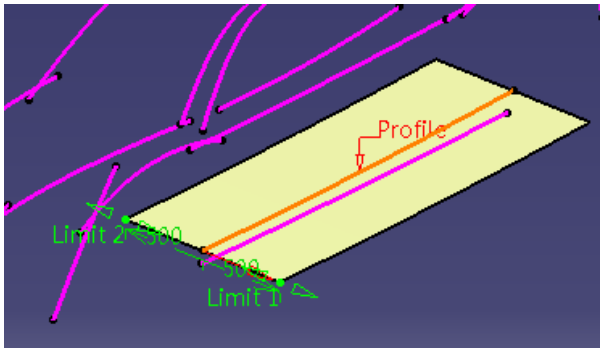


- Create a sketch on XY plane
- Create an extruded surface

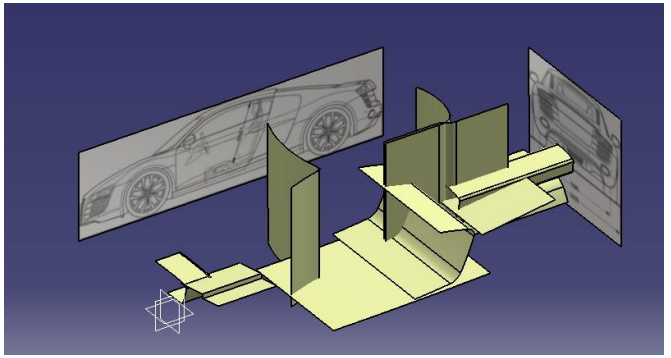


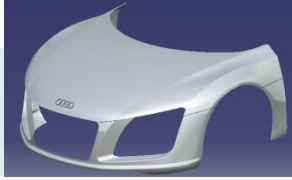


- Create an extruded surface
  - Profile: 3d curve
  - Direction: XZ plane



- (There should be 10 parting surfaces in the geometrical set “parting_surface”)
- **Save file “R8_master_a.catpart”**



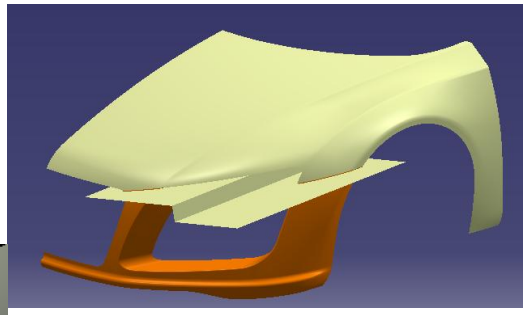


R8_front body

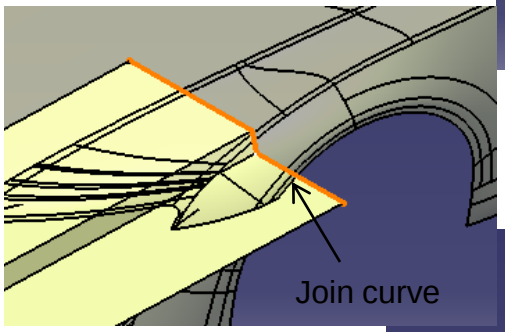
Tutorial 8E

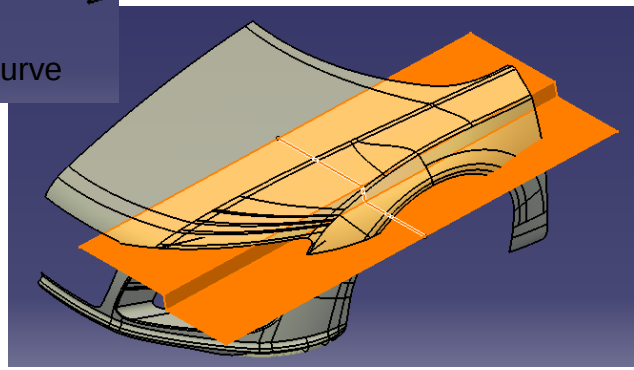
- **Start a new part file**

- Copy three surfaces from the master model
  (Paste Special, "as result with link")



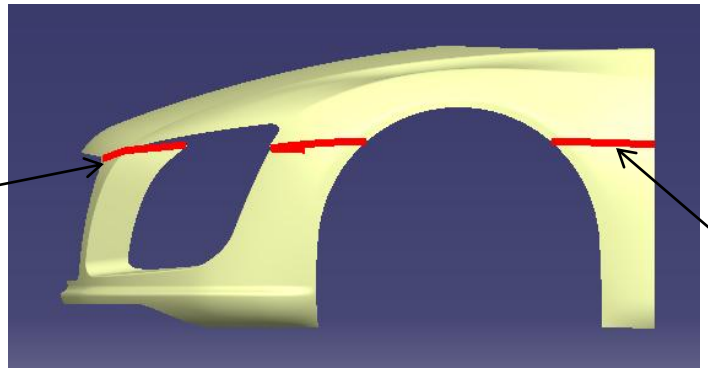
- Create a join curve (3 edges)
- Extrapolate the surface from the join curve (850mm)

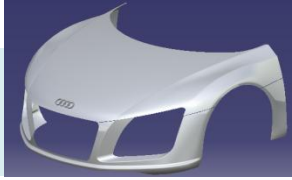




- Create an offset surface
  (Surface: Extrapolated surface; Offset 3mm)

- Split surfaces (so that there can be a 3mm gap between two surfaces)

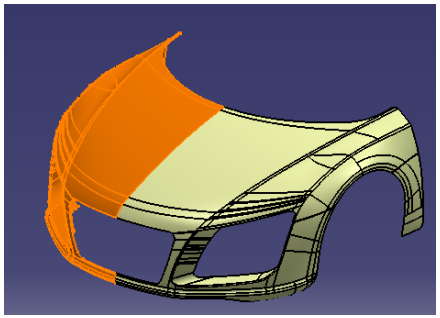




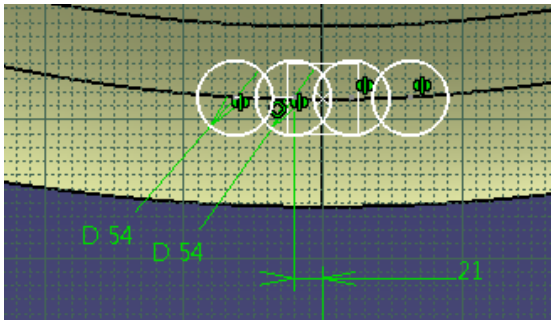
R8_front body

Tutorial 8E

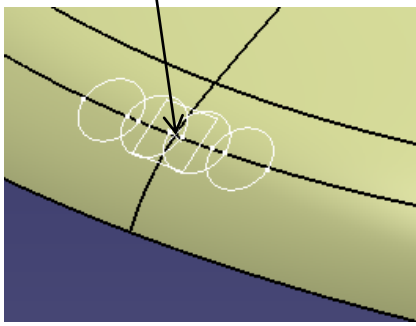
- Multi-select three surfaces, then make symmetry



- Create a new geometrical set
- Create a point at endpoint of the edge ☆
- Create a plane (tangent to surface)
- Create a sketch (4 circles)

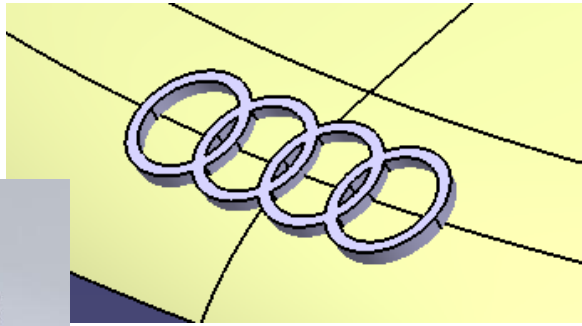


Make a point and then a plane here ☆



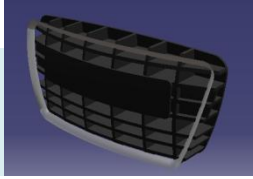
- Switch to “part design” workbench
- Create a pad (Limit 1= 5mm, Limit 2= 5mm, thickness 1,2 = 3mm)

- Apply material “Tungsten” to Part body
- Apply material “ Grey Blue” to geometrical set.1



- **Save File as “R8_frontbody_a.catpart”**

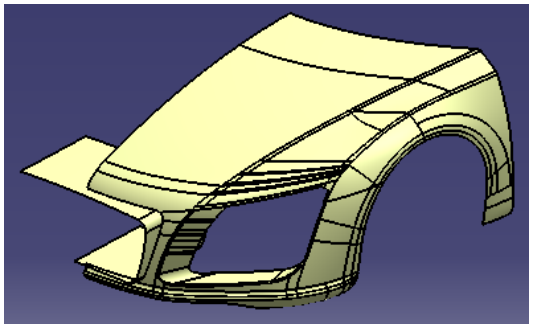
Not For Commercial Use



R8_grille

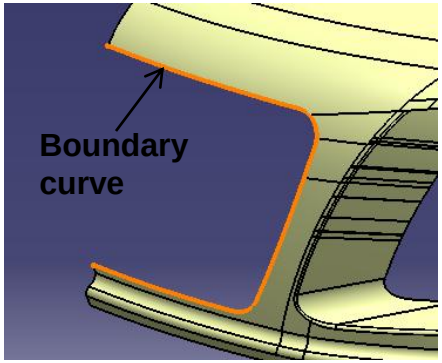
Tutorial 8E

- **Start a new part file**



- Copy 3 surfaces from the master model
- **(Paste Special, “as result with link”)**

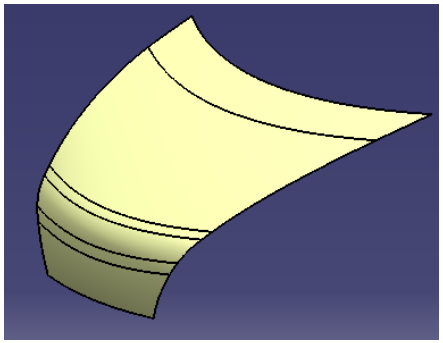
- Join 2 surfaces
- Create a boundary curve

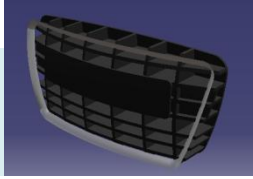


- Copy the multi-sections surface from the master model

  (Paste Special, “as result with link”)

  (the surface should be the first surface in the master model)

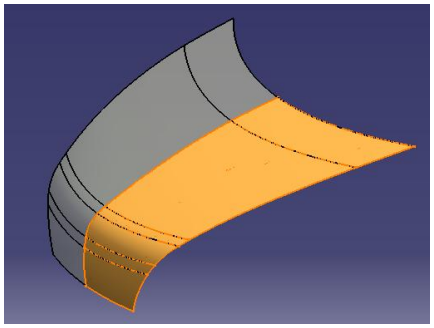




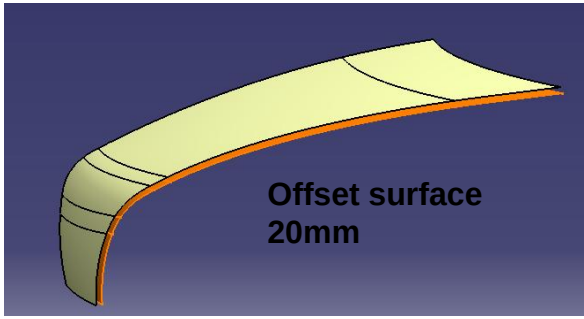
R8_grille

Tutorial 8E

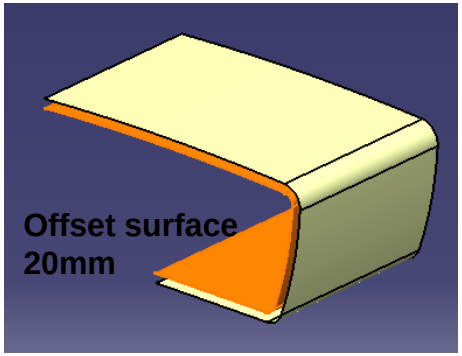
- Split the surface by right plane

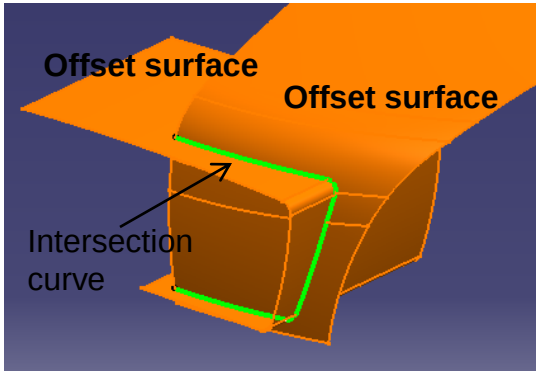


- Create an Offset surface (20mm inward)

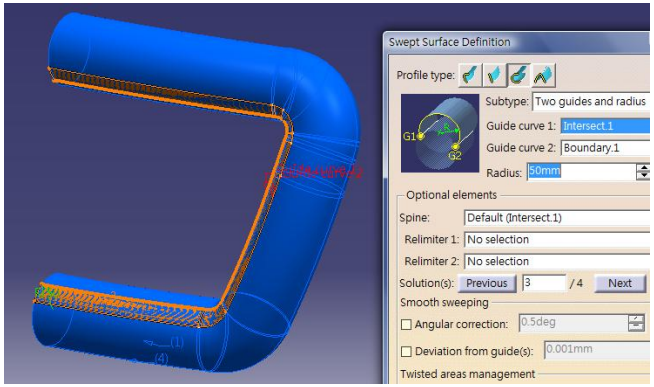


- Create another Offset surface (20mm inward)
- Create an intersection curve (between the above two offset surfaces)

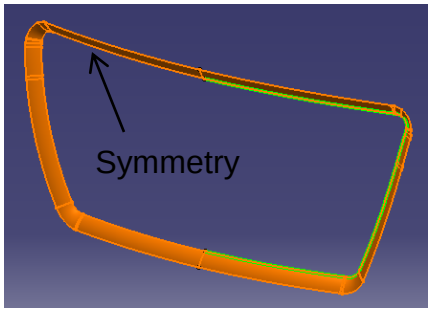


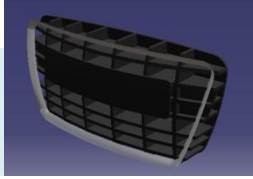


- Create a swept surface
  - profile: circular
  - subtype: 2 guides & radius
  - radius: 50mm



- Create a symmetry surface

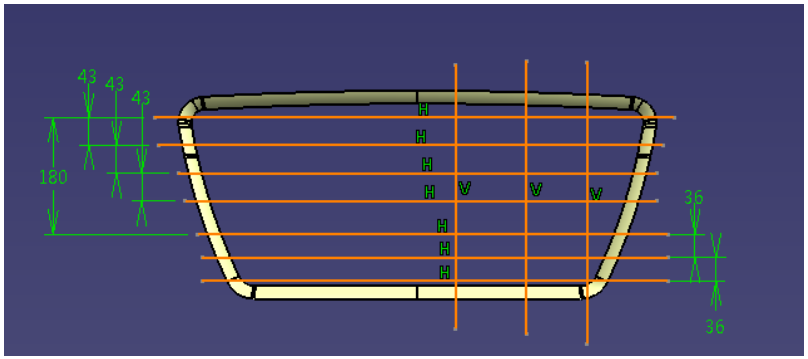




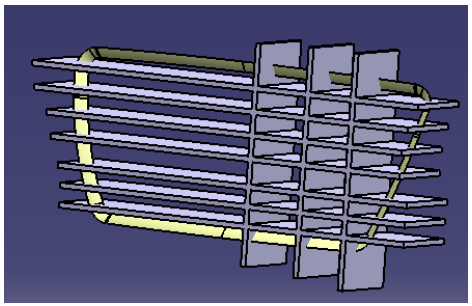
R8_grille

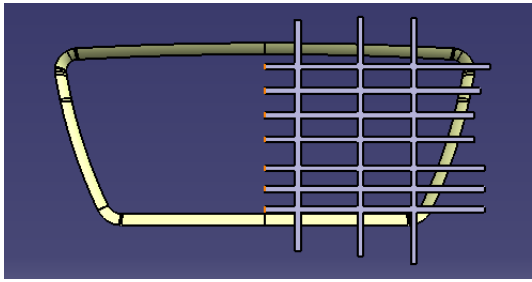
Tutorial 8E

- Switch workbench to “part design”
- Create a sketch on YZ plane
  (Draw a few lines as shown)

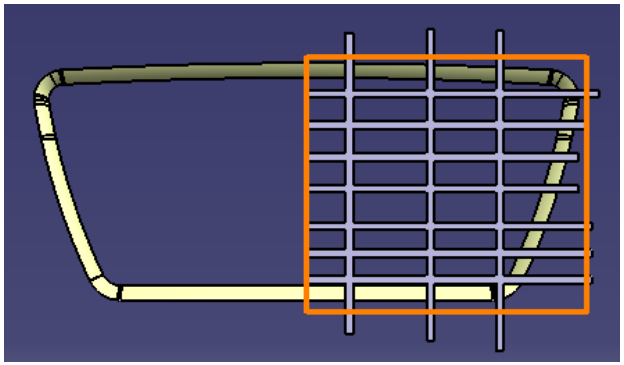


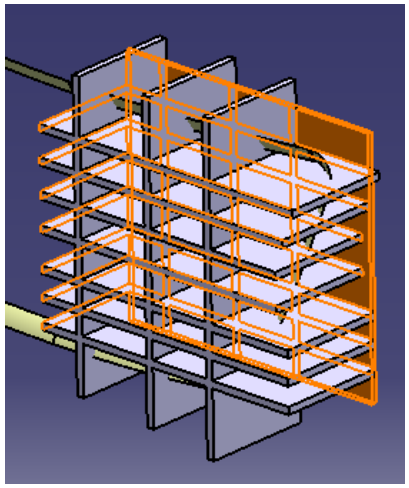
- Create a pad (150mm, thickness1,2 =5mm)

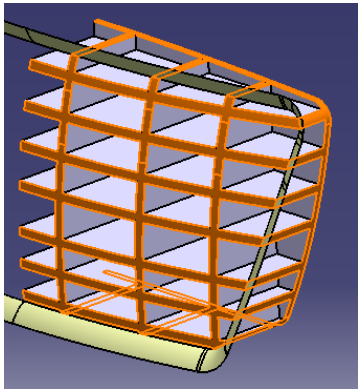


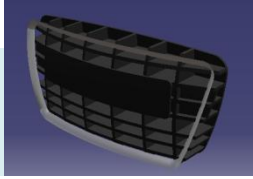


- Split the solid by XZ plane
- Create a sketch (a rectangle)
- Create a pad (5mm)
- Split solid by the two offset surfaces





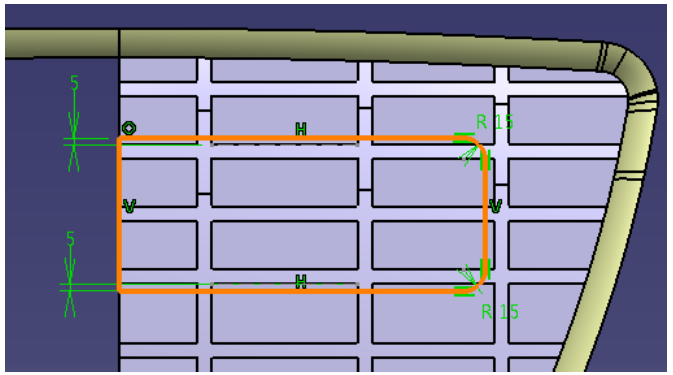


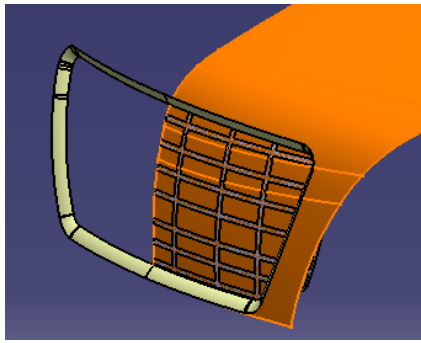


R8_grille

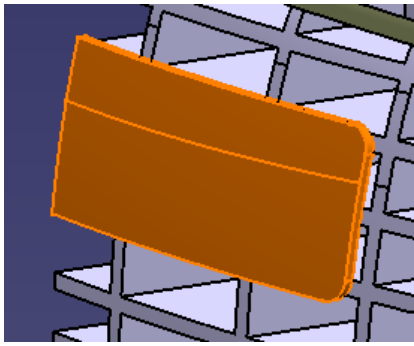
Tutorial 8E

- **Create a new body**
- Thick the offset surface (5mm thick, outward)
- Create a sketch on Yz plane
- Pocket (up to last)

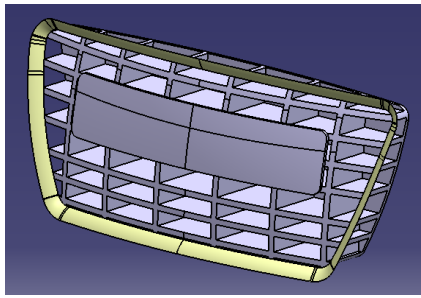




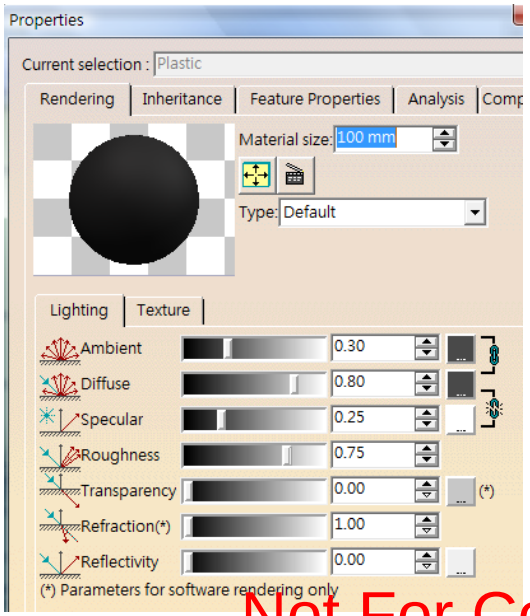
- Add Body



- Mirror Body



- Apply material “Tungsten” to “geometrical set.1”



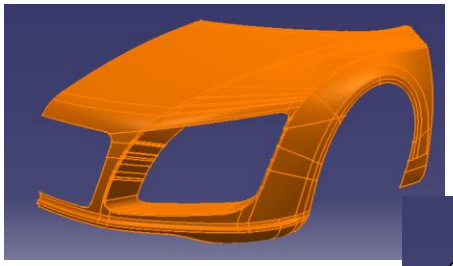
- Apply material “Plastic” to Partbody,
- Change parameters (as table) to Black
- **Save File as “R8_grille_a.catpart”**

Not For Commercial Use

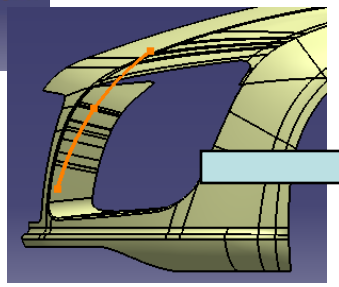
R8_head light

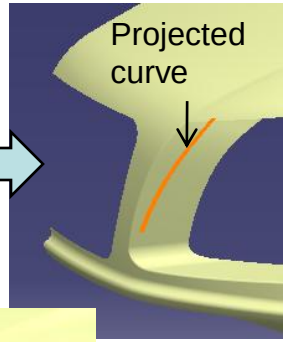
Tutorial 8E

- **Start a new part file**
- Copy two surfaces from the master model **(Paste Special, "as result with link")**

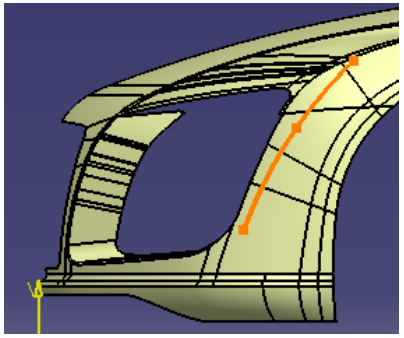


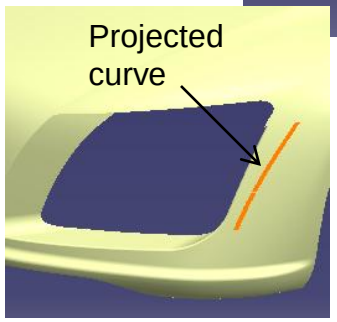
- Create a sketch on XZ plane
- Project sketch on surface



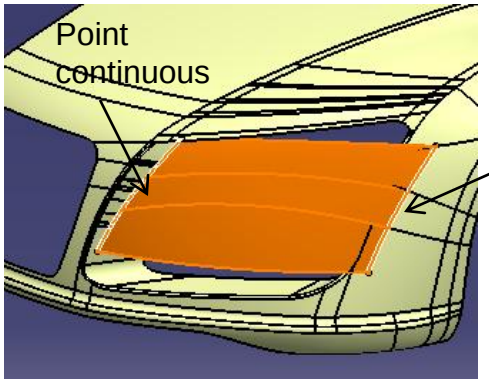


- Create an offset plane (XZ plane, 1300mm)
- Create a sketch on the offset plane
- Project sketch on surface





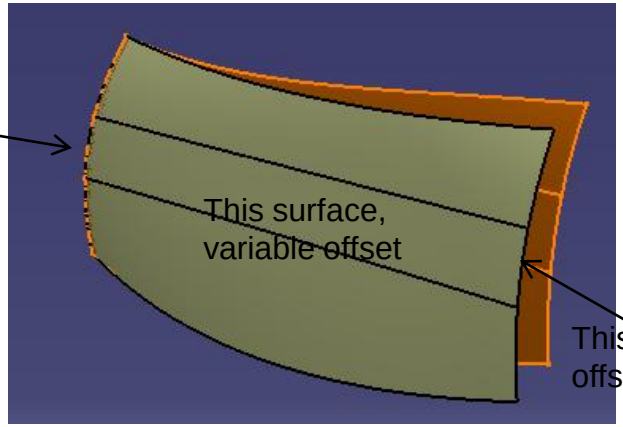
- Create a blend surface (tangent continuous on one side, point continuous on other side)



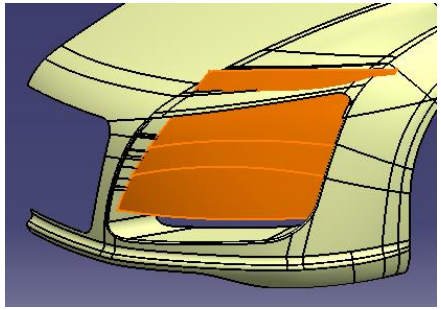
R8_head light

Tutorial 8E

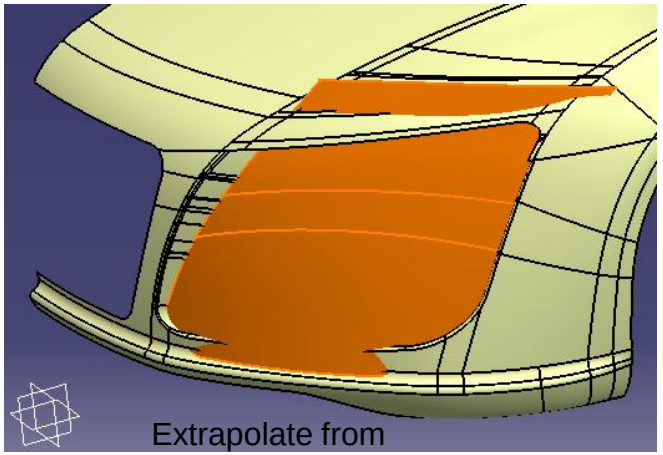
- Create a variable offset (edge 0mm, edge 15mm, surface- variable)



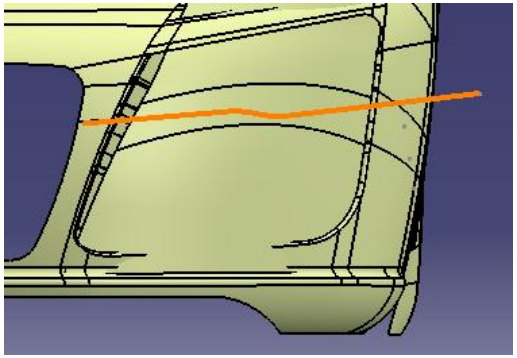
- Extrapolate the offset surface (upper edge) (100mm, “assemble result”)



- Extrapolate the surface (lower edge) again (100mm, “assemble result”)



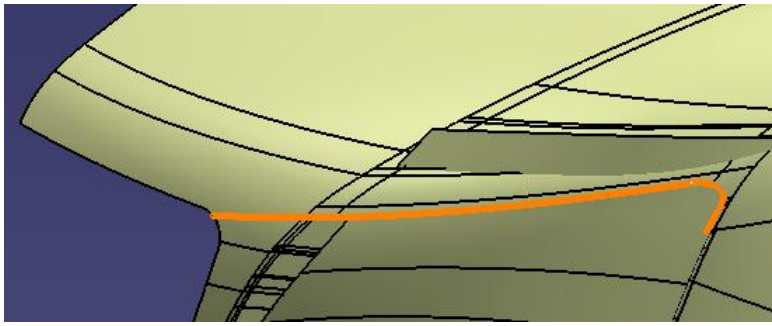
- Create a sketch on YZ plane



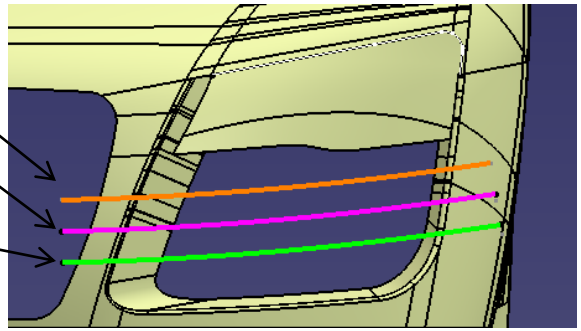
R8_head light

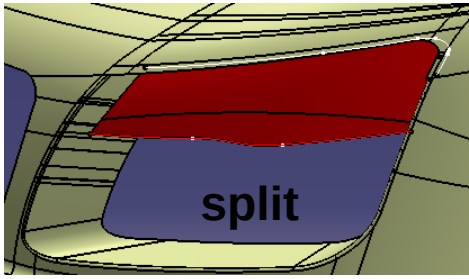
Tutorial 8E

- Extract curve (from the surface edge)
- Project curve onto extrapolated surface
- Project sketch onto extrapolated surface
- Split surface

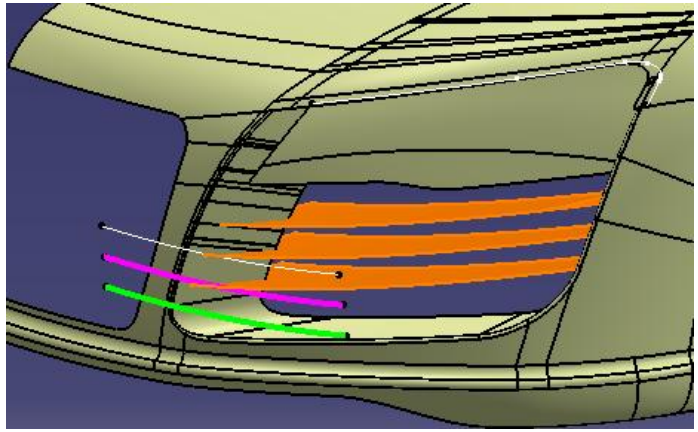


- Create a sketch on YZ plane
- Parallel curve (offset 43mm)
- Parallel curve (offset 43mm)





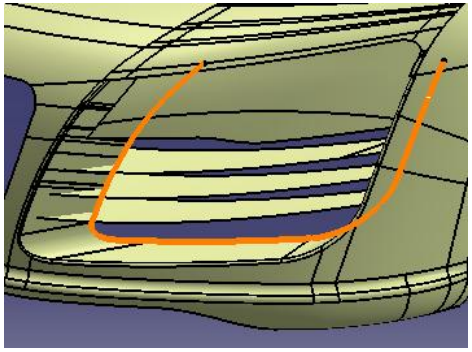
- Project curves (3 times)
- Create 3 extrude surfaces (Length 150mm)

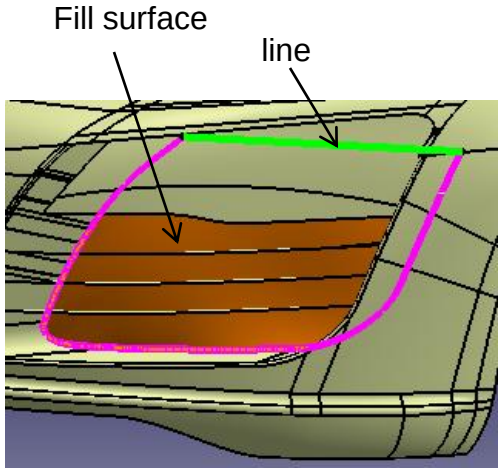


R8_head light

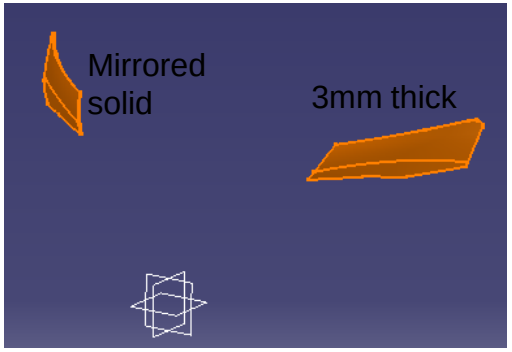
Tutorial 8E

- Create a boundary curve
- Create a line (from start point of boundary curve to endpoint of the curve)
- Create a fill surface

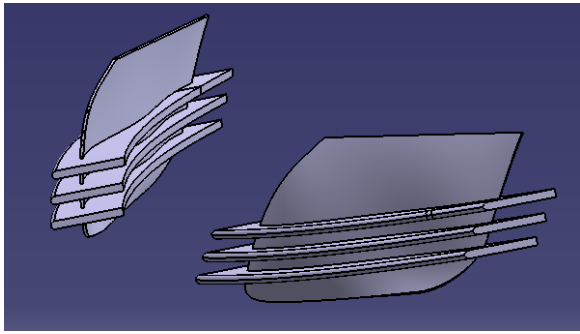




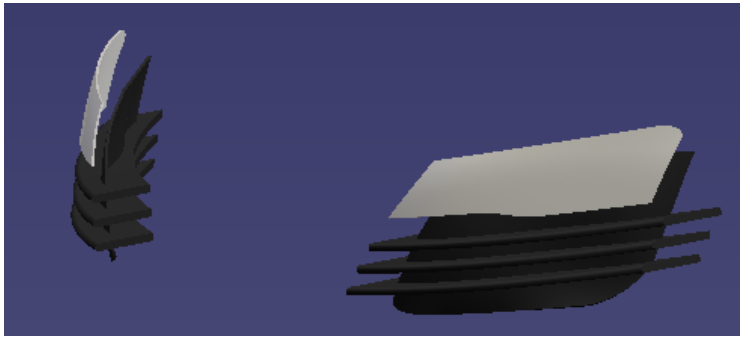
- Switch workbench to “Part Design”
- Thick surface (3mm)
- Mirror



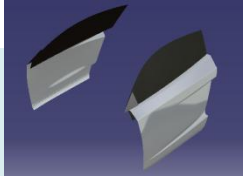
- **Insert a new body**
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness1,2 =8mm)
- Thick surface (thickness = 3mm)
- Fillet R8mm
- Mirror



- Apply Material “White” to “Part Body”
- Apply Material “Plastic – black” to “Body.2”



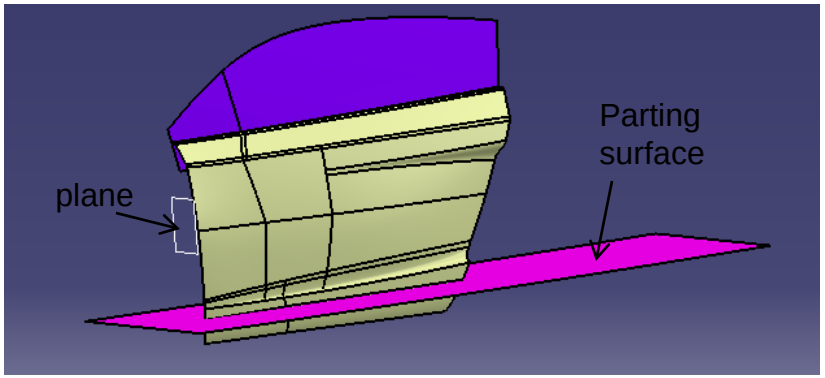
- **Save File as “R8_headlight_a.catpart”**



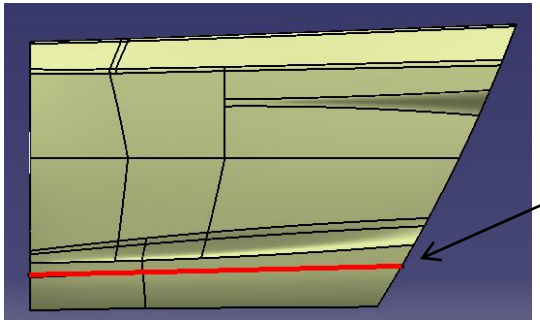
R8_door

Tutorial 8E

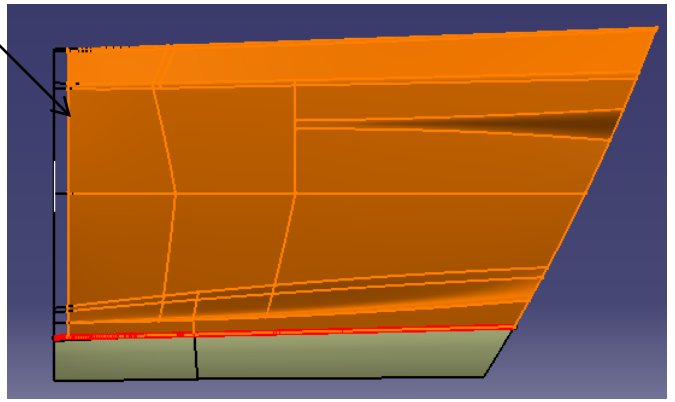
- **Start a new part file**
- Copy 3 surfaces & a plane from the master model **(Paste Special, "as result with link")**



- Create an Offset surface (3mm, parting surface)
- Split surface (by the offset surface)



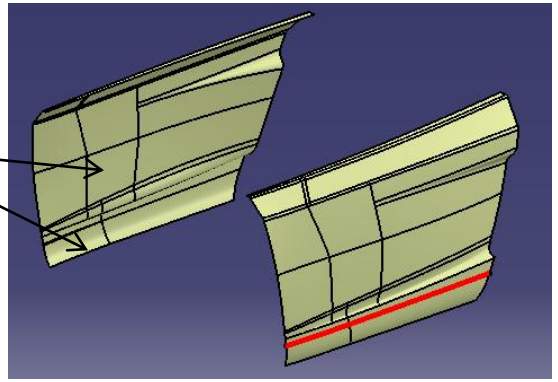
Split by 3mm offset plane

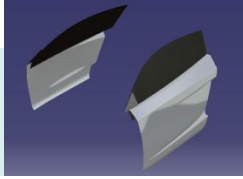


- Offset plane (3mm, backward)
- Split surface (by offset plane)

- Multi-select the two split surfaces, then Create symmetry

symmetry

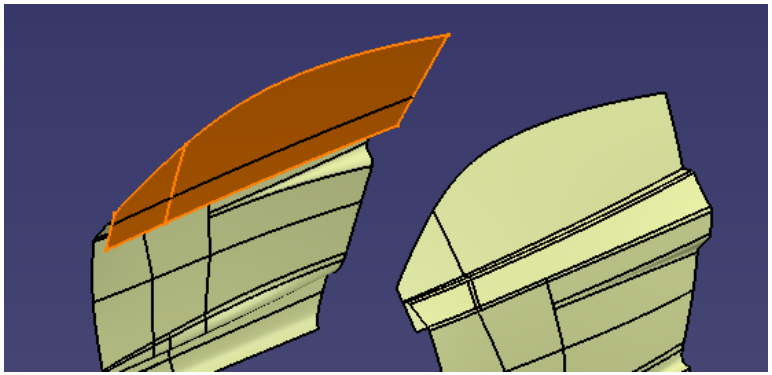




R8_door

Tutorial 8E

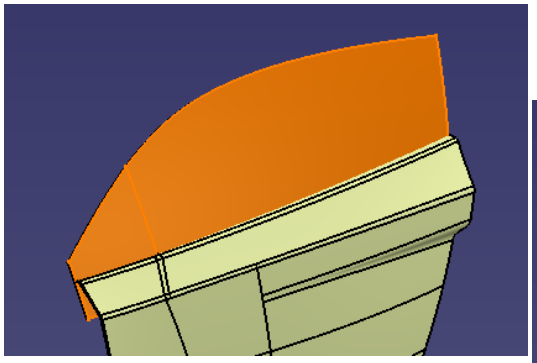
- **Insert a new geometrical set**
- Create symmetry of the surface (window)

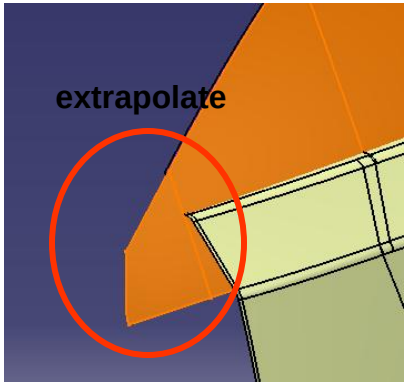


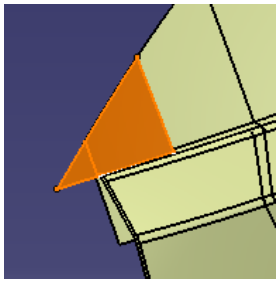
- **Insert a new geometrical set**

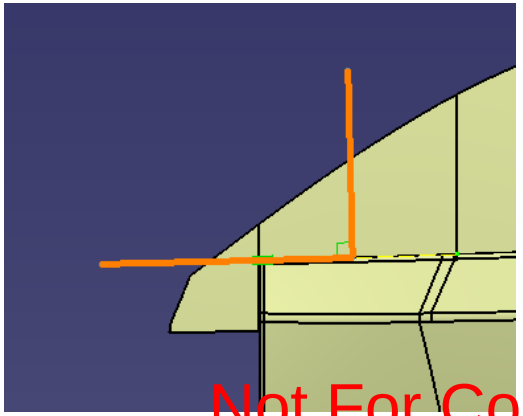
- Offset surface (10mm, outward)
- Extrapolate the offset surface (~120mm)
- Create a sketch on XZ plane (Draw two lines)
- Project the curve on the extrapolated surface
- Split surface

- Create symmetry

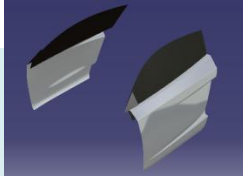








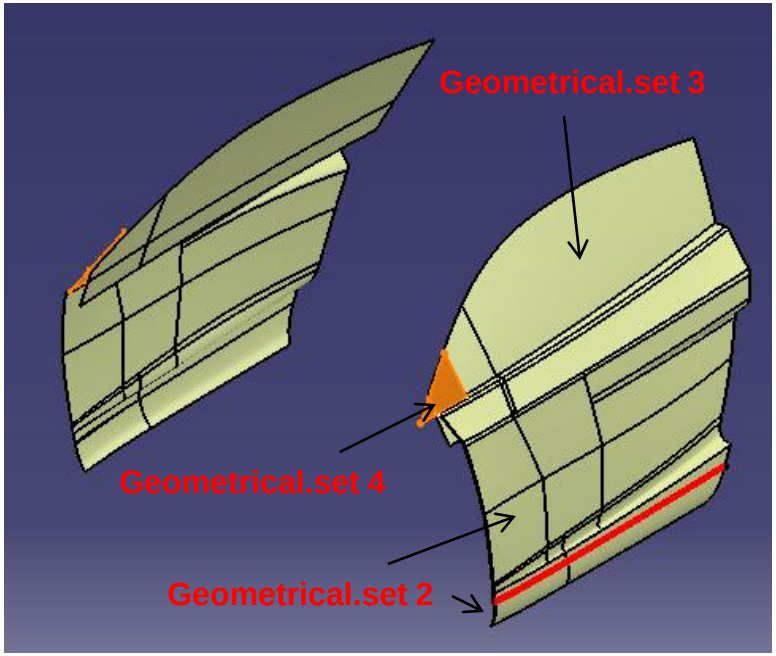
Not For Commercial Use

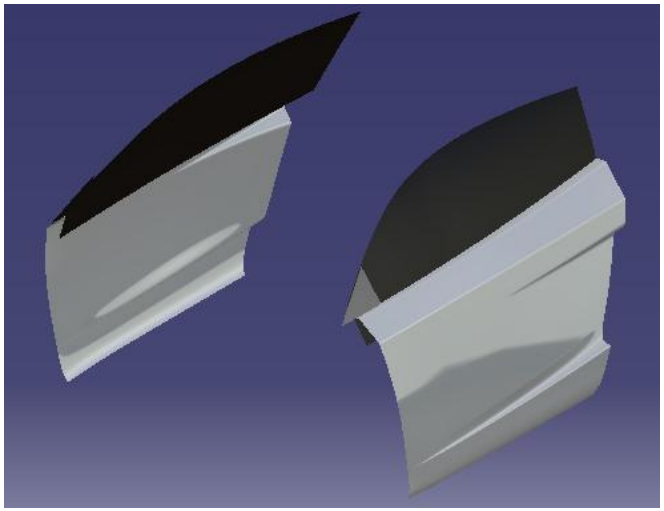


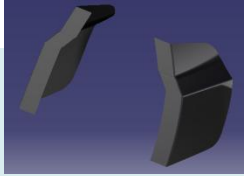
R8_door

Tutorial 8E

- Apply material “Grey blue” to geometrical.set.2
- Apply material “Black” to geometrical.set.3
- Apply material “DS Black” to geometrical.set.4
- **Save File as “R8_door_a.catpart”**



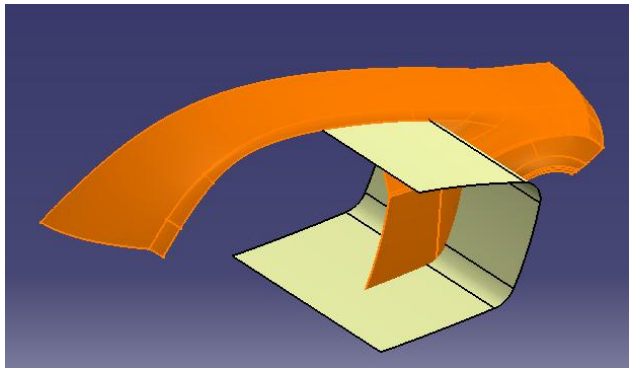


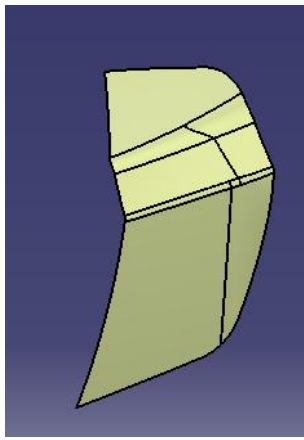


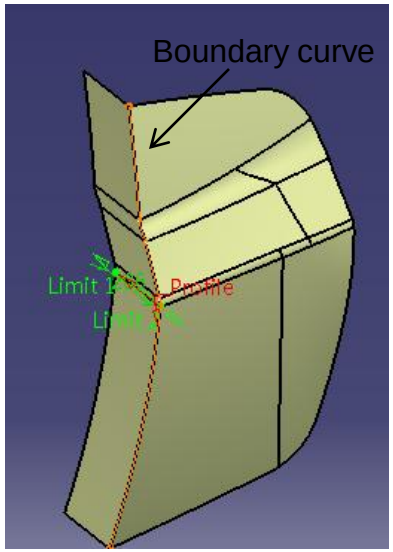
R8_side cover

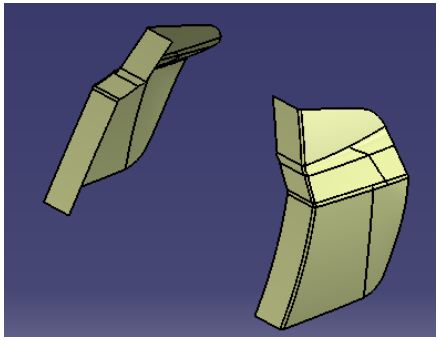
Tutorial 8E

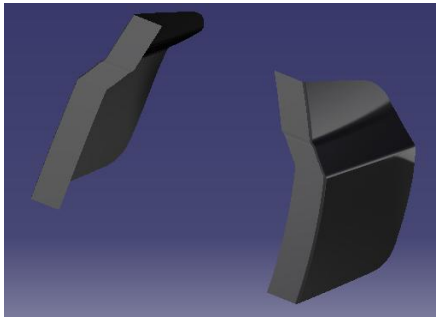
- **Start a new part file**
- Copy two surfaces from the master model **(Paste Special, “as result with link”)**
- Split surface
- Create a boundary curve
- Create an extruded surface (200mm)
- Create Shape fillet (R10mm)
- Create a symmetry surface
- Apply material “DS black” to geometrical.set.2
- **Save File as “R8_sidecover_a.catpart”**

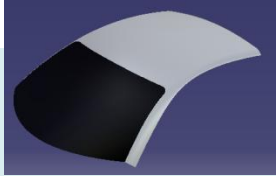










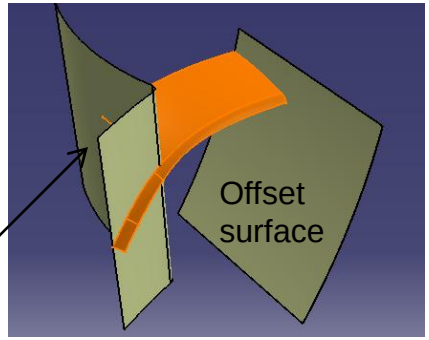


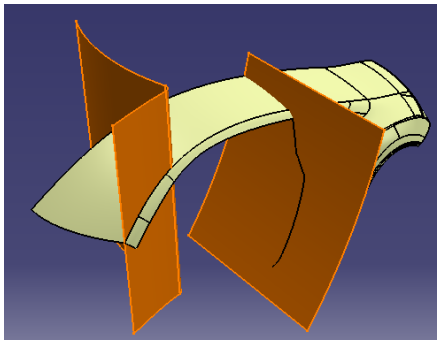
R8_top cover

Tutorial 8E

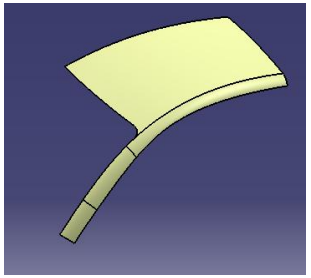
- **Start a new part file**

- Copy three surfaces from the master model **(Paste Special, “as result with link”)**

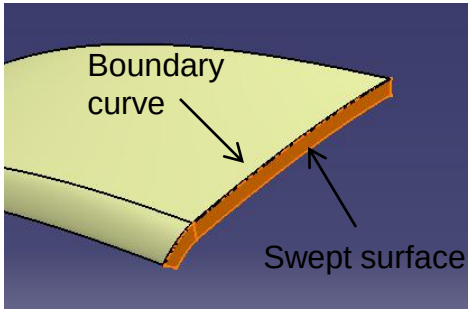




- Create an offset surface (3mm, forward)
- Split surface by the offset surface
- Split surface by the front parting surface

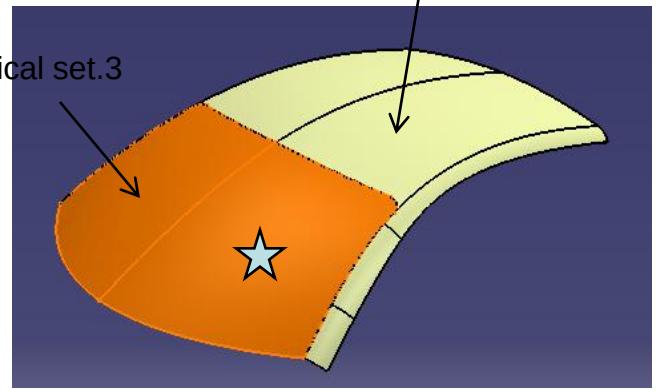


- Create a boundary curve
- Create a swept surface (90deg, 30mm)

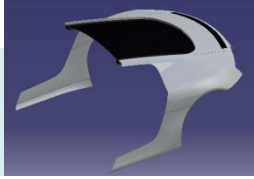


- Create symmetry surfaces

- **Insert a new geometrical set**
- Split surface ☆
- Create symmetry



- Apply material “Grey blue” to geometrical set.2
- Apply material “Black” to geometrical set.3
- **Save File as “R8_topcover_a.catpart”**

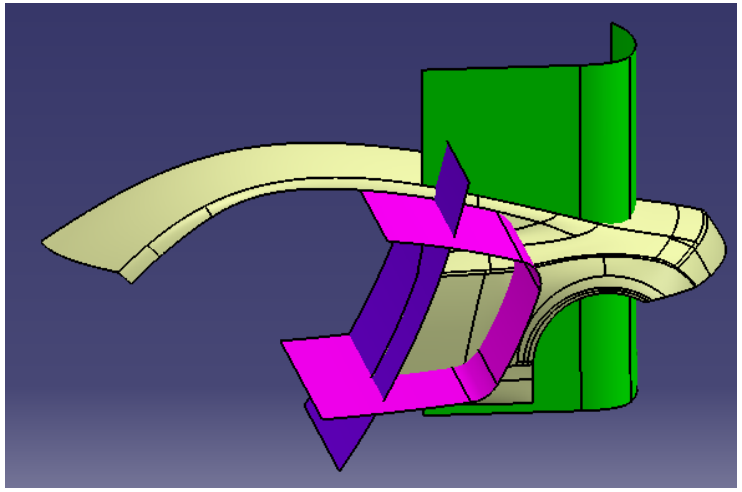


R8_rear cover

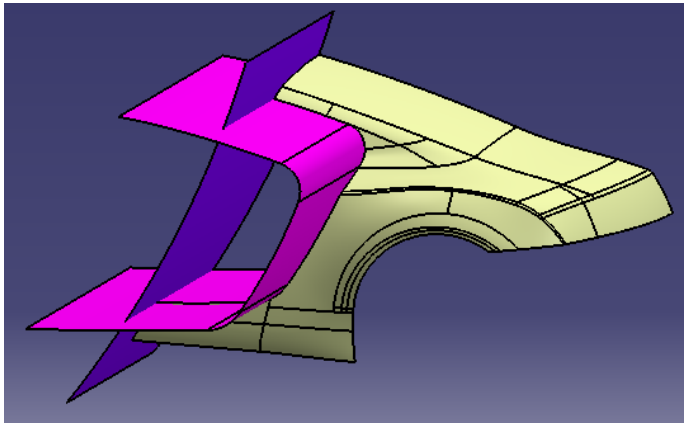
Tutorial 8E

- **Start a new part file**

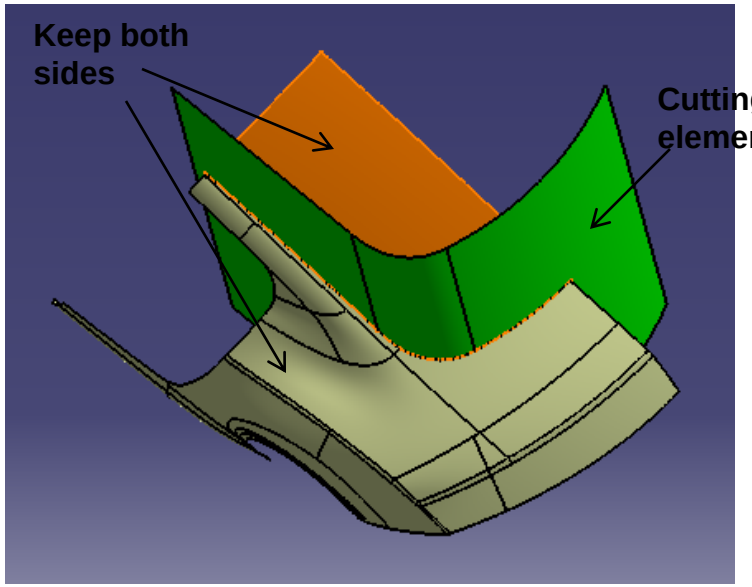
- Copy four surfaces from the master model **(Paste Special, “as result with link”)**

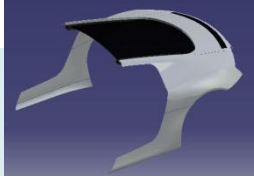


- Split surface



- Split surface into **2 (Keep both sides)**

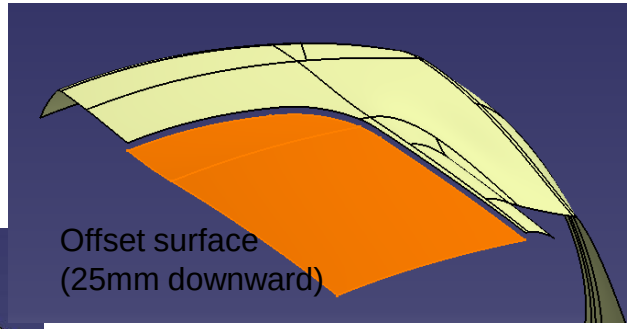




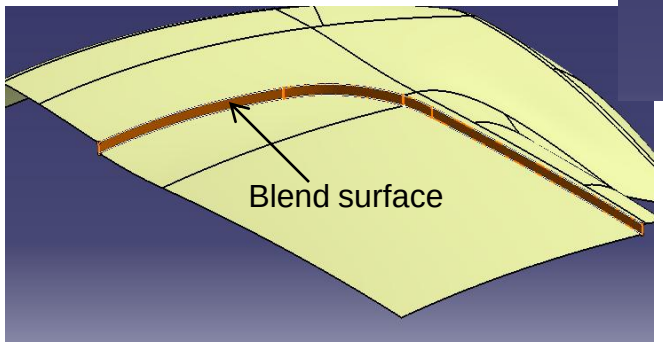
R8_rear cover

Tutorial 8E

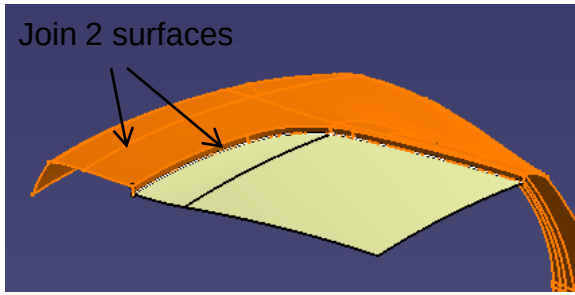
- Create an Offset surface (25mm, downward)



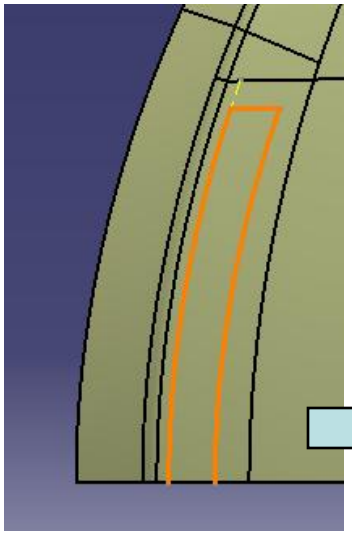
- Create a boundary curve
- Create a boundary curve
- Create a Blend surface

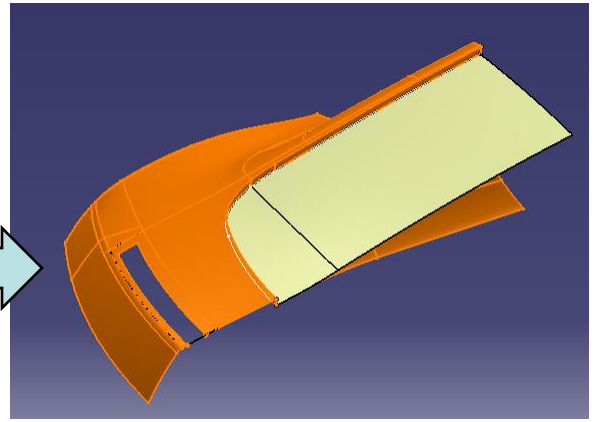


- Join 2 surfaces

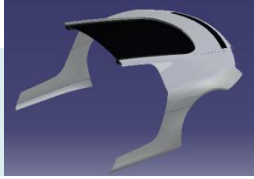


- Create a sketch on xy plane
- Project sketch onto the join surface
- Split surface





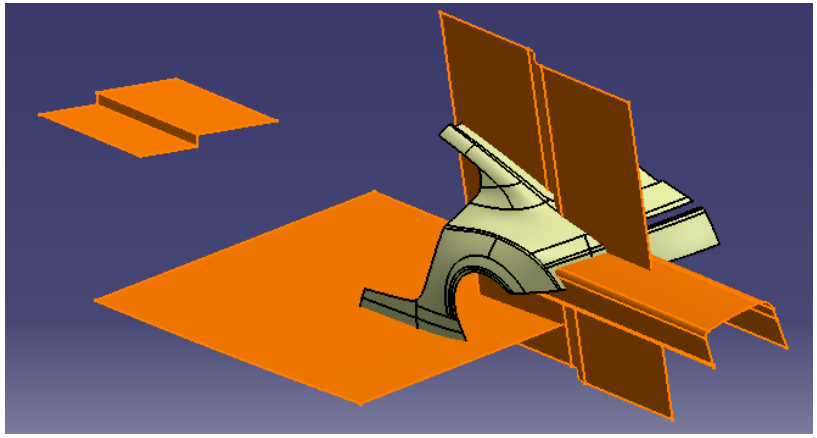
Not For Commercial Use



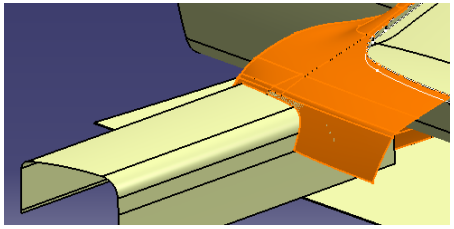
R8_rear cover

Tutorial 8E

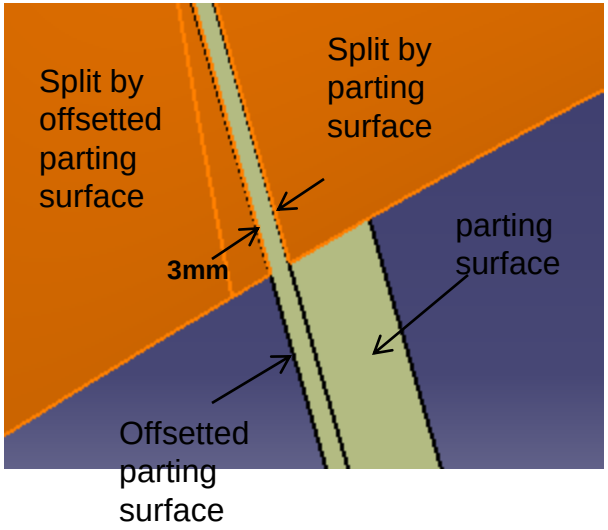
- Copy another four surfaces from the master model
  (Paste Special, "as result with link")

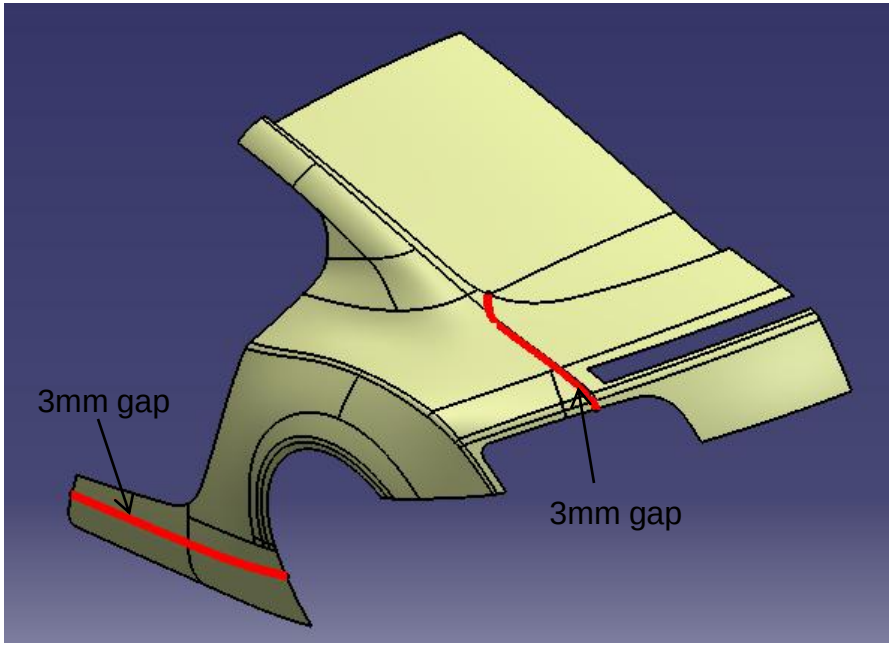


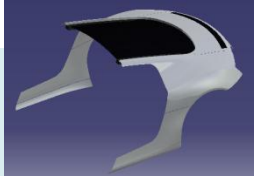
- Split surface



- Create Offset surfaces (3mm)
- Split surfaces (so that there can be a 3mm gap between 2 surfaces)



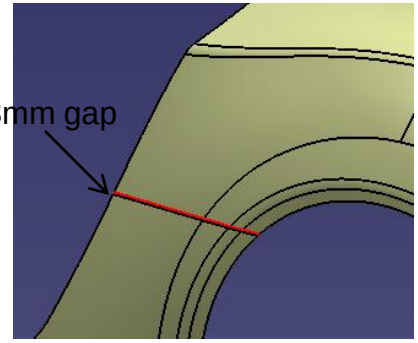


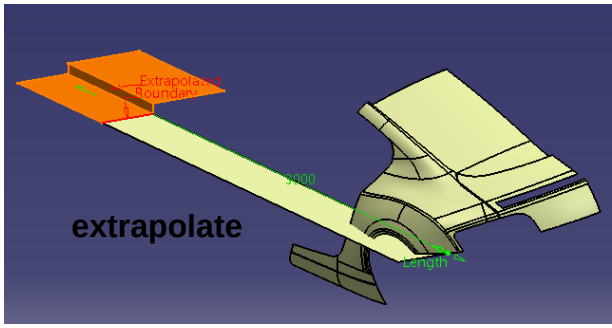


R8_rear cover

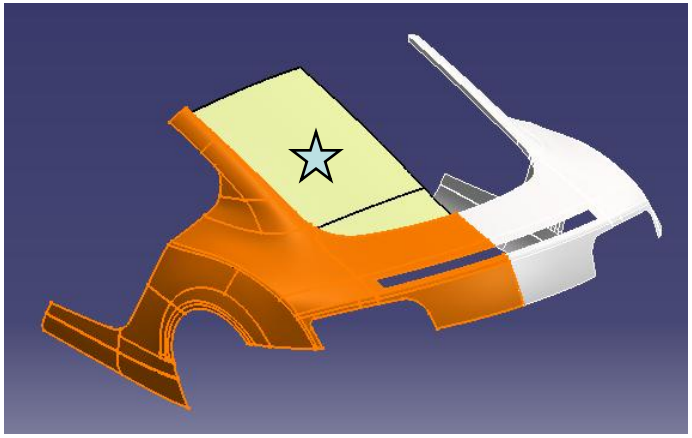
Tutorial 8E

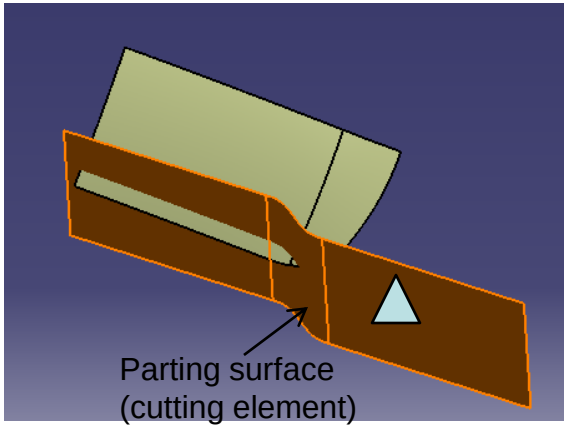
- Extrapolate the parting surface (3000mm)
- Create an Offset surface (3mm)
- Split surfaces



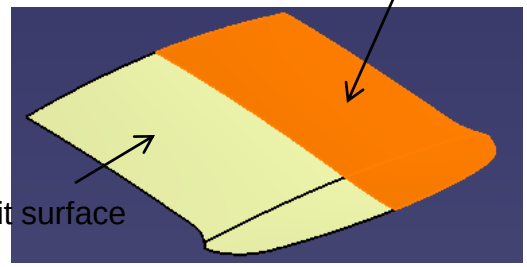


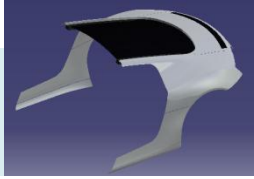
- Create symmetry surfaces (except the translated surface)





- **Insert a New Geometrical set**
- Right –click the offset surface ☆ , select “Change geometrical set…”, select the new one
- Split the surface by a parting surface △
- **Create a symmetry surface**

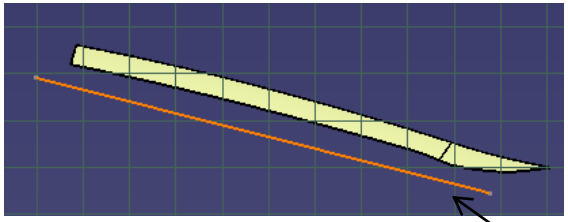


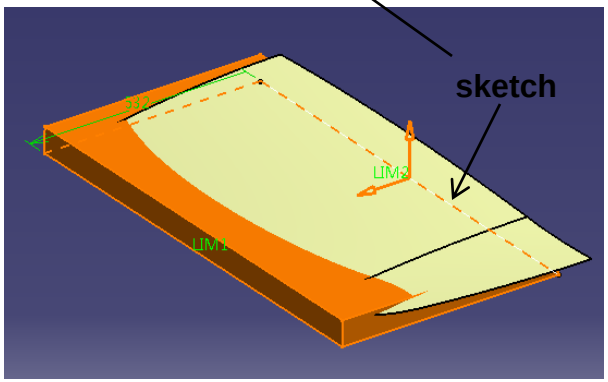


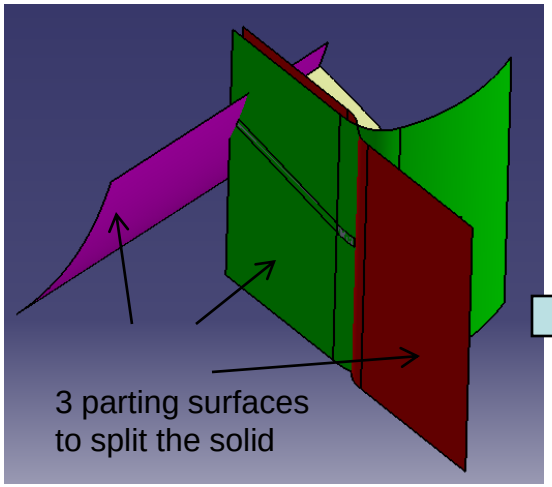
R8_rear cover

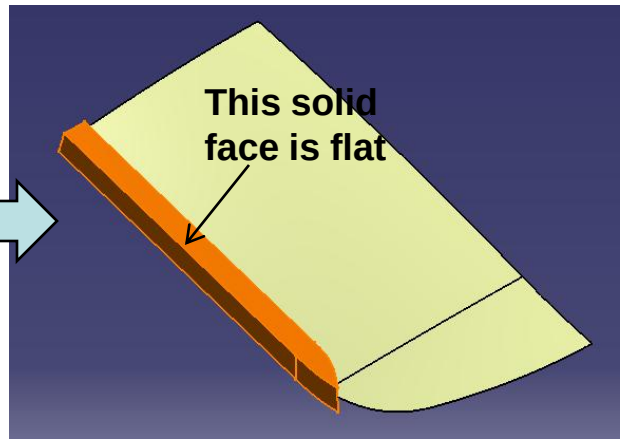
Tutorial 8E

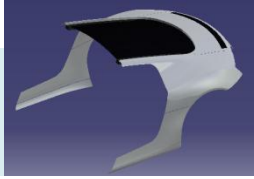
- Switch workbench to “Part Design”
- Create a sketch on XZ plane
  (Draw a straight line)
- Create a Pad (limit1 ~550mm, thick~60mm, totally cover the cut)
- Split by 3 parting surfaces (as shown)







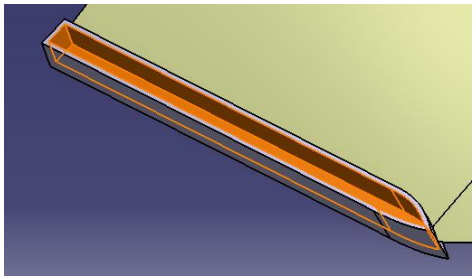


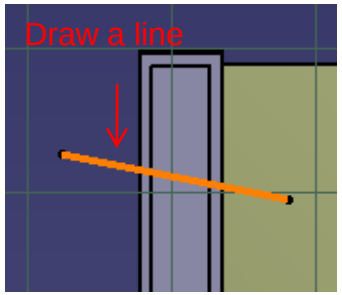


R8_rear cover

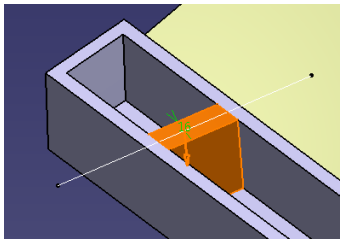
Tutorial 8E

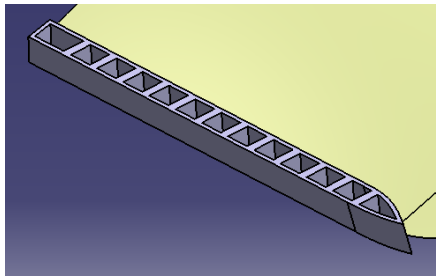
- Shell (8mm, one open end)
- Create a sketch on the planar face
- Create a stiffener (16mm thick)
- Create a rectangular pattern
  (12 instances, 60mm spacing)

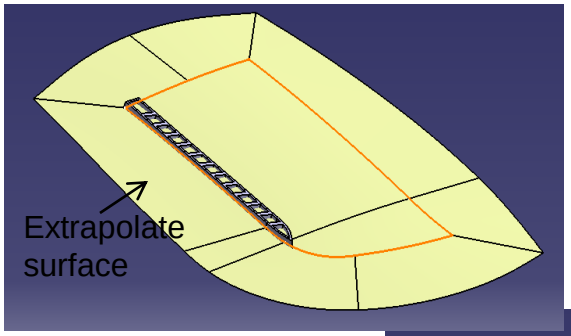




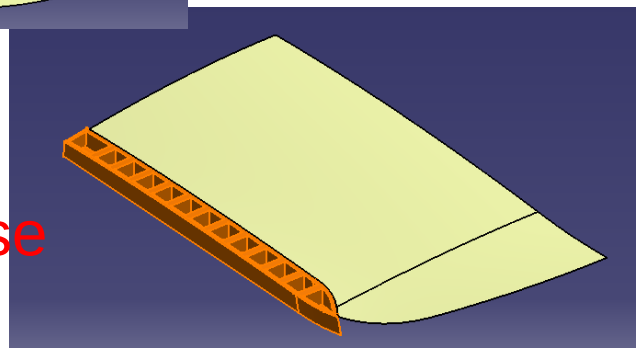
- Switch workbench to “generative shape design”
- Create a boundary curve (whole boundary of the offset surface)
- Extrapolate the offset surface by 300mm (select “assemble result”)



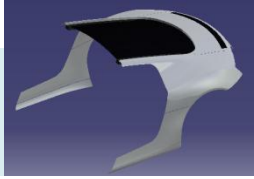




- Switch workbench to “part design”
- Split the solid by the extrapolated surface
- Mirror



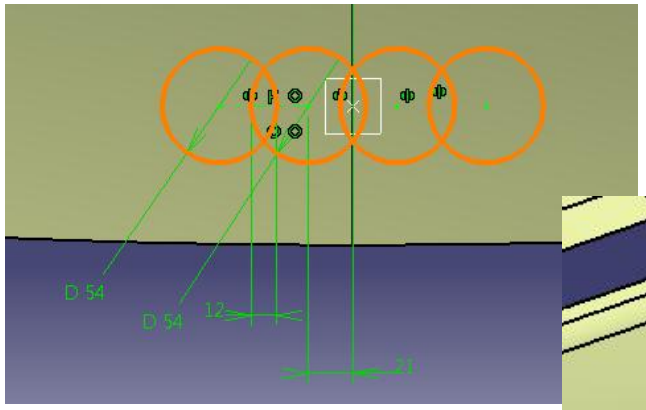
Not For Commercial Use

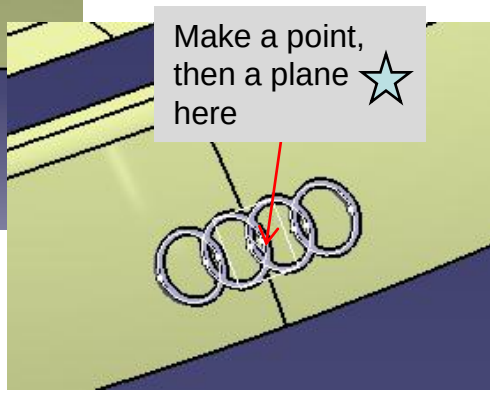


R8_rear cover

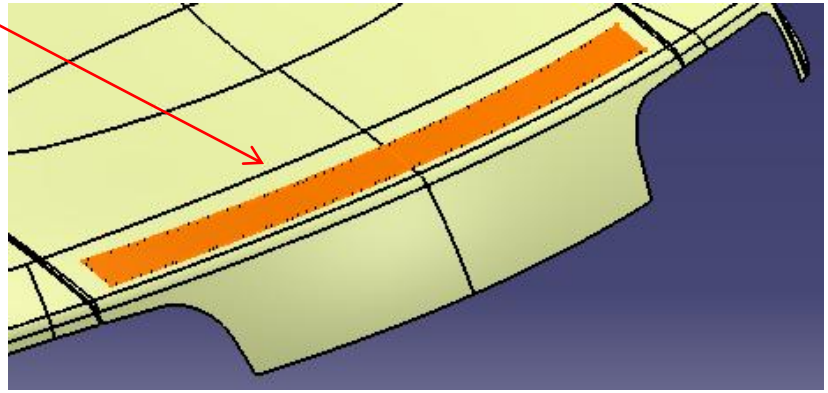
Tutorial 8E

- **Insert a new body** (Body.2)
- Create a point ☆
- Create a plane
- Create a sketch on the plane
- Create a pad
  (Limit 1= 5mm, Limit 2= 5mm,
  thickness 1,2 = 3mm)





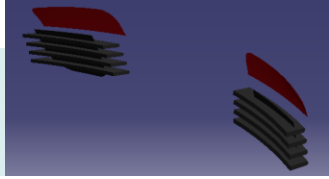
- Switch workbench to “generative shape design”
- Insert a new geometrical set
- Create a split surface & symmetry (as shown)



- Apply material “Grey Blue” to geometrical set.2
- Apply material “Black” to geometrical set.3
- Apply material “Black” to geometrical set.4

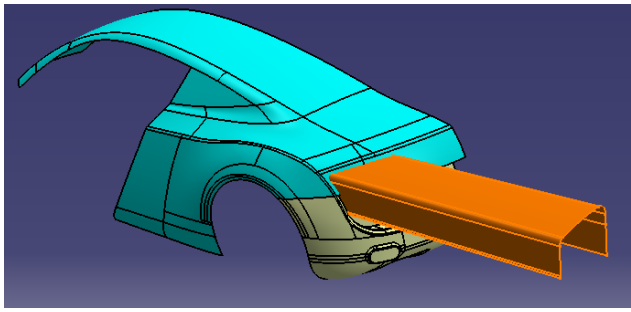
- Apply material “plastic black” to Partbody
- Apply material “tungsten” to Body.2

- **Save File as “R8_rearcover_a.catpart”**

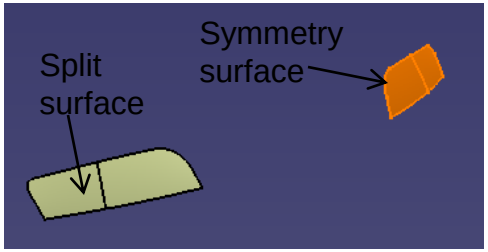


R8_tail light

Tutorial 8E

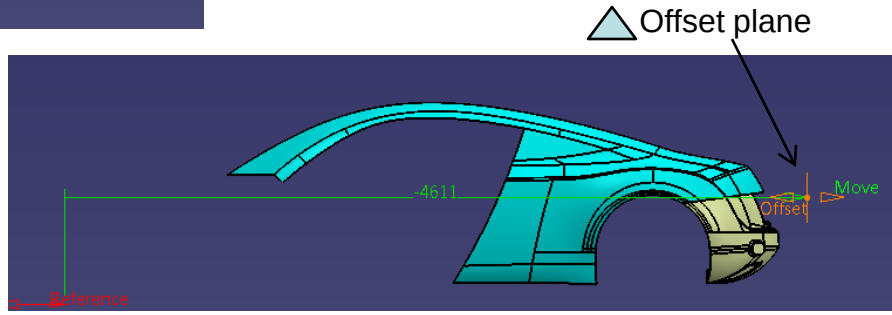


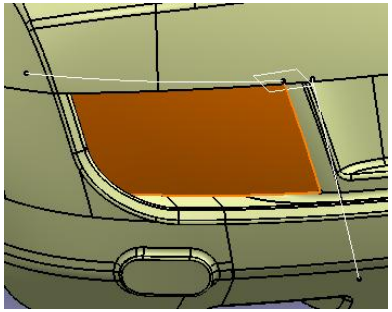
- **Start a new part file**
- Copy 3 surfaces from the master model **(Paste Special, “as result with link”)**

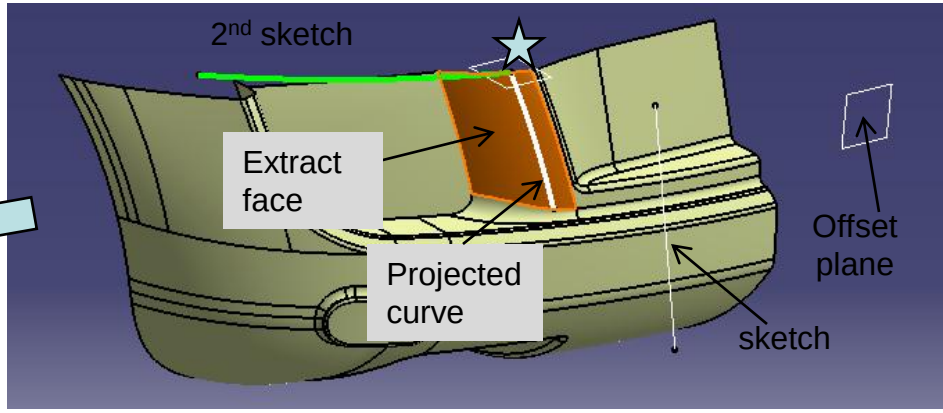


- Split surface by parting surface
- Symmetry

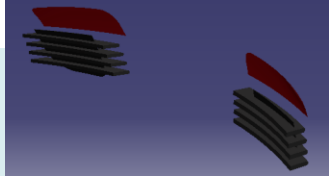
- **Insert a new geometrical set**
- Create an offset plane △
- Create a sketch on the plane (draw a line)
- Extract a face
- Project sketch onto the extract surface
- Create a plane at the endpoint ☆
- Create a sketch on the 2nd plane (draw an arc)
- Create a swept surface







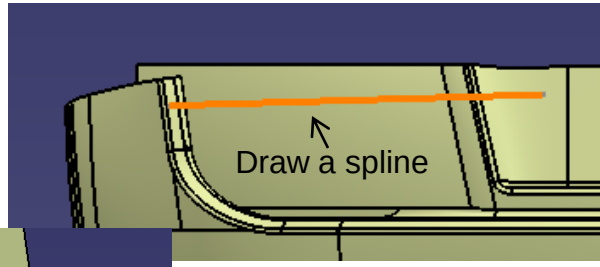
A- 101



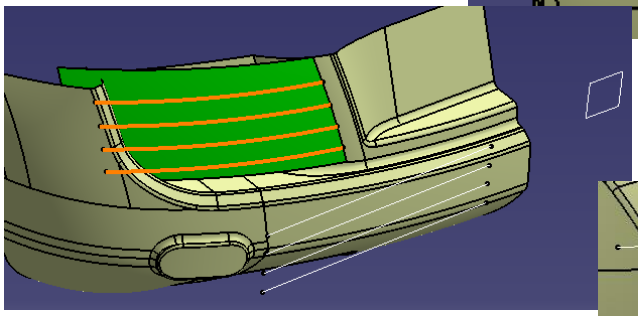
R8_tail light

Tutorial 8E

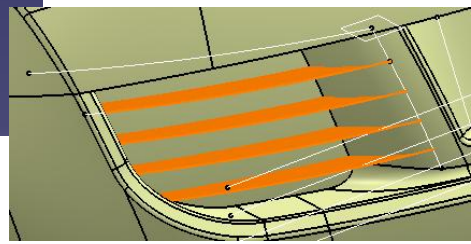
- Create a sketch on the offset plane (draw a spline)
- Create Parallel curves (spacing 43mm, 3 instances)



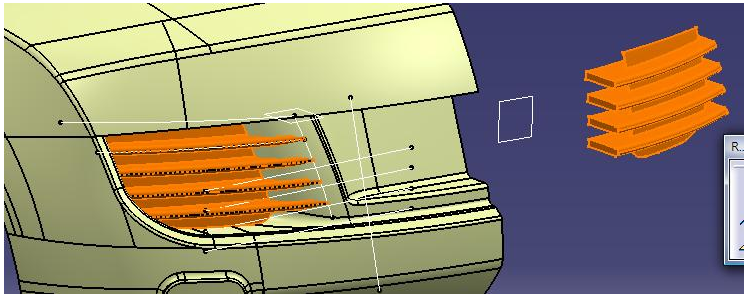
- Project curves on the swept surface



- Extruded surfaces (x4) – 98 mm long
- Extract a back face

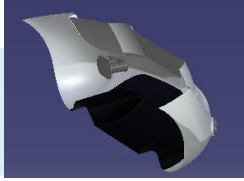


- Switch workbench to “Part Design”
- Thick surface (thickness1,2 = 8mm) (x4)
- Fillet R8mm



- Thick surface (back extracted face, 2mm)
- **Mirror**
- Apply “Plastic black” to PartBody
- Apply ‘DS red” to “geometrical set.2”
- **Save File as “R8_taillight_a.catpart”**

 Non-Commercial Use

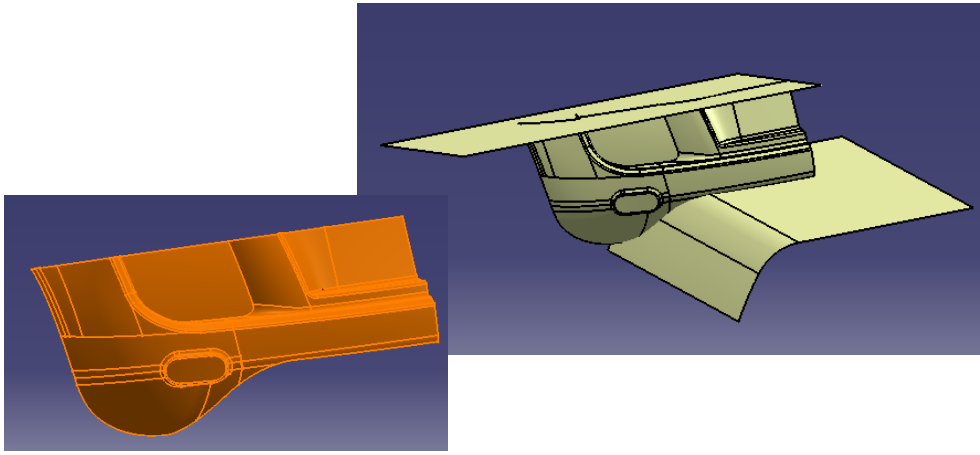


R8_rear body

Tutorial 8E

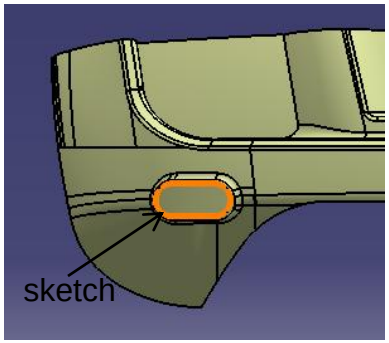
- **Start a new part file**

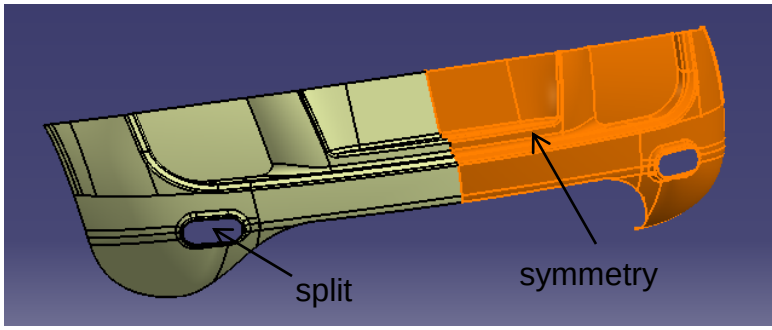
- Copy 3 surfaces from the master model
  (Paste Special, “as result with link”)



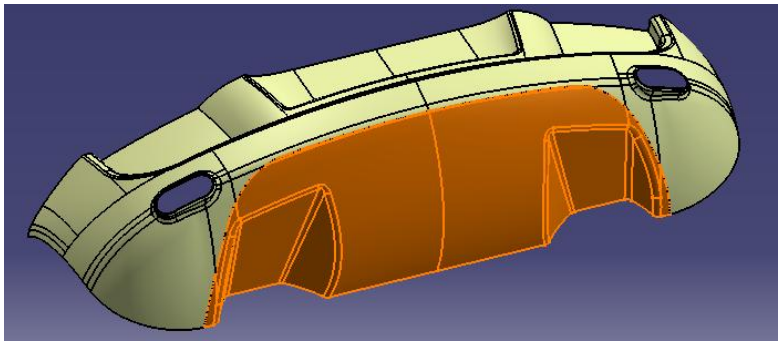
- Create an offset ”top” parting surface (3mm)
- Split surface by the offset surface & the other parting surface

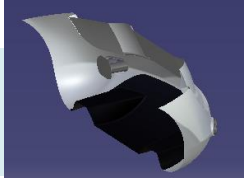
- Create a sketch on Yz plane
- Project sketch onto surface
- Split surface
- Symmetry surface





- **Insert a new geometrical set**
- Show the original copied surfaces from the master model
- Split surface by a parting surface
- Symmetry surface



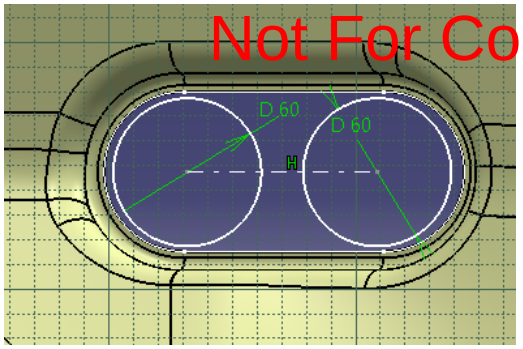


R8_rear body

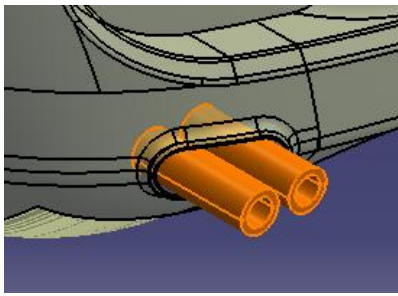
Tutorial 8E

Not For Commercial Use

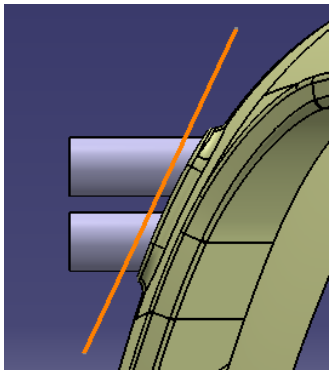
- Switch workbench to “Part Design”

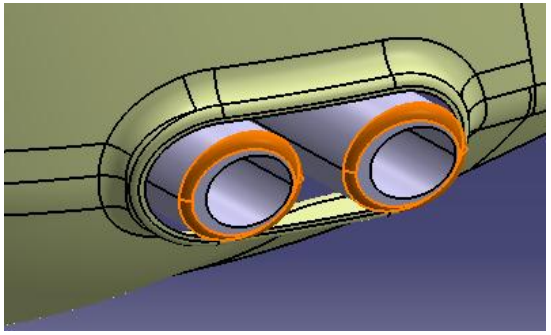


- Create an offset plane (4230mm from YZ plane)
- Create a sketch (two circles)
- Pad (190mm, 10mm thick)

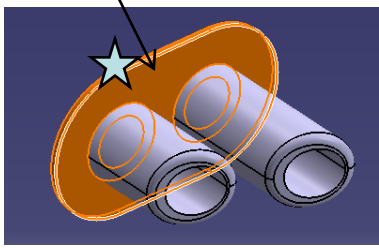


- Create a sketch on XZ plane (a line)
- Pocket (up to last)
- Fillet 6mm



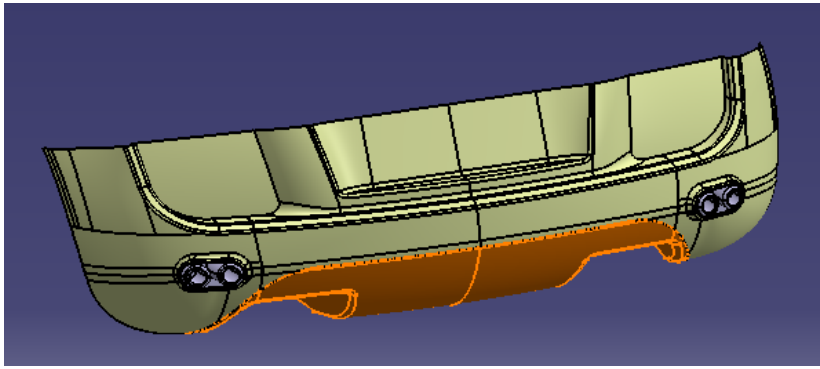


- Create a sketch
- Pad (5mm) ☆



- Mirror

- Apply material “grey blue” to geometrical set.2
- Apply material “plastic black” to geometrical set.3
- Apply material “titanium” to Partbody

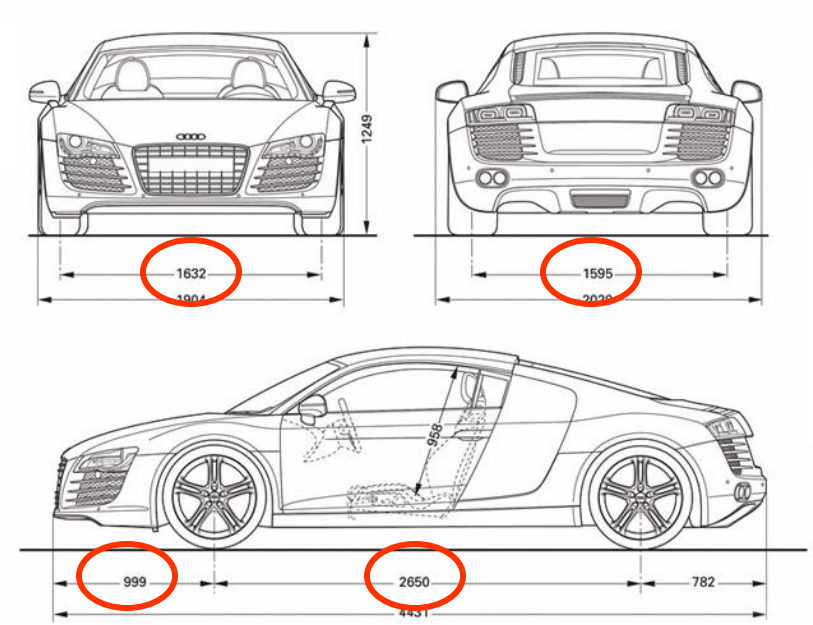


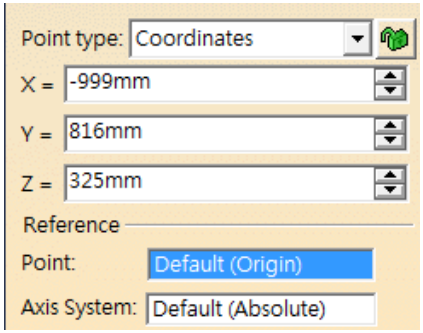
- **Save File as “R8_rearbody_a.catpart”**

R8_dummy chassis

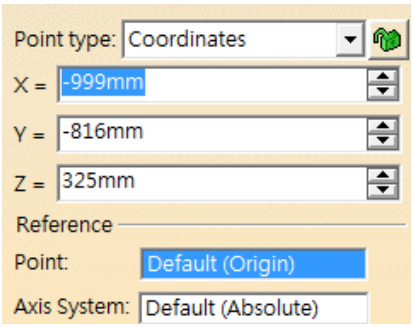
Tutorial 8E

- **Start a new part file**

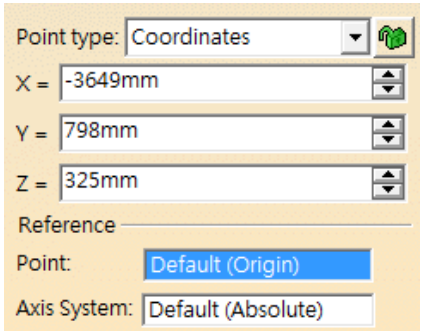




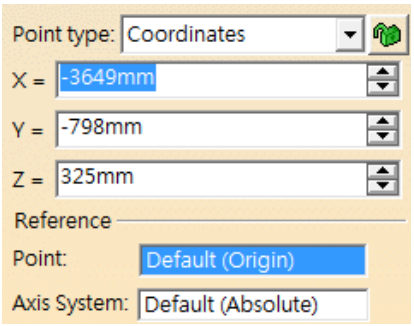
Front_wheel_left



Front_wheel_right

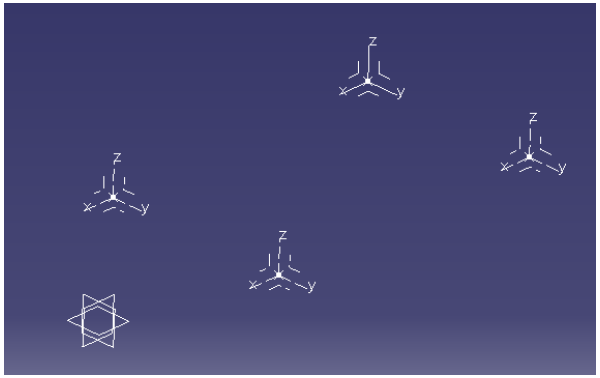


Rear_wheel_left



Rear_wheel_right

- Create 4 points as tables
- Create an Axis system at each point

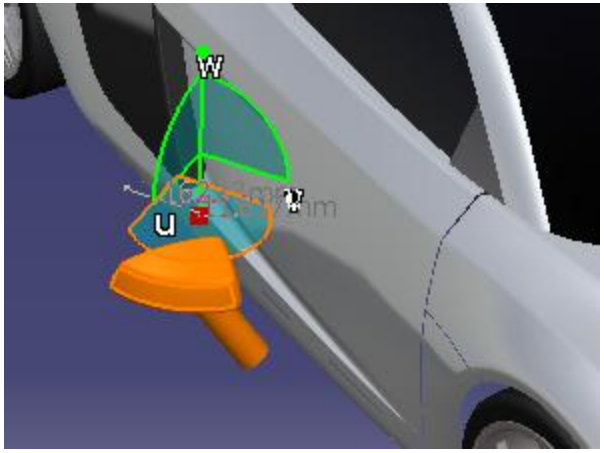


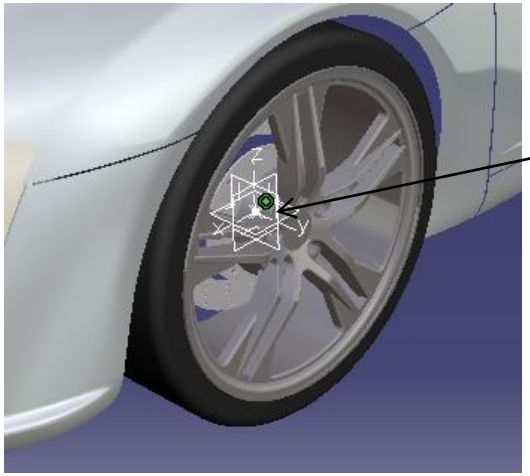
- **Save File as "R8_dummychassis_a.catpart"**

Assembly

Tutorial 8F

- File new product
- Insert all part files
- Insert front wheels, then locate them onto the Axis systems of “dummy chassis”
- Insert rear wheels, then locate them.
- Insert “mirror” part file
- Locate it by compass



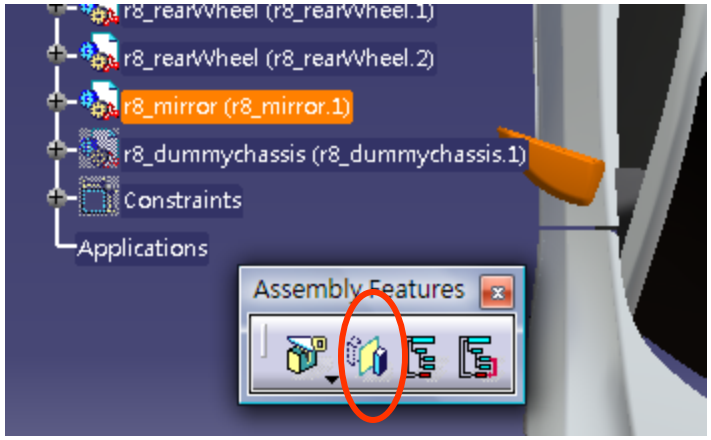


Add 3 coincident constraints (plane to plane)

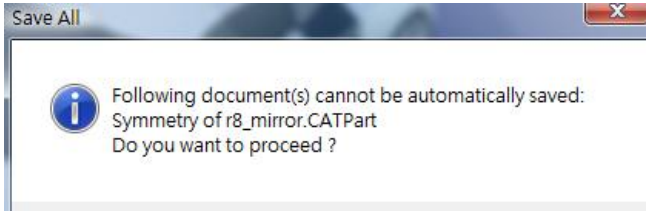
Assembly

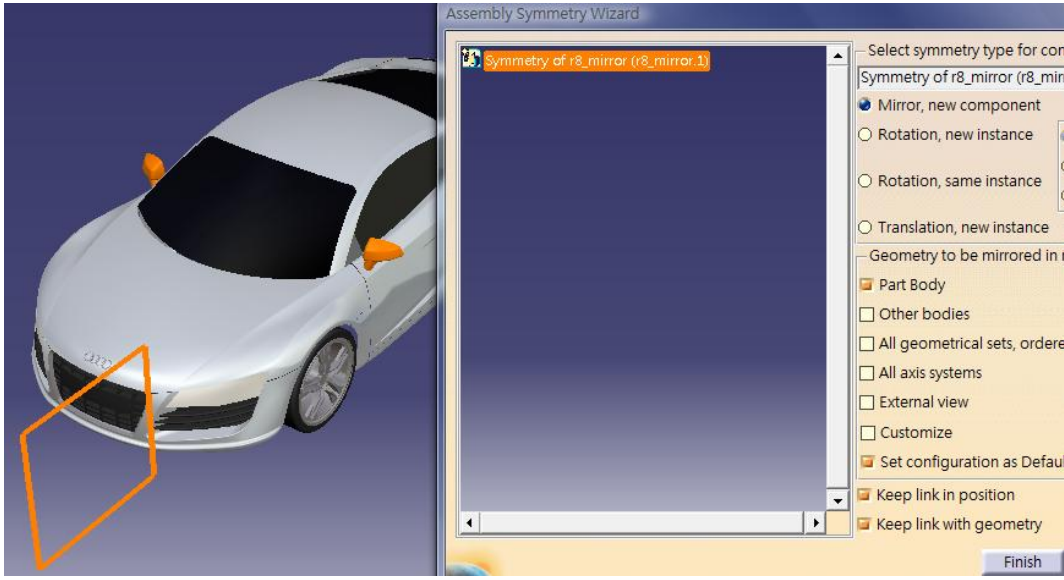
Tutorial 8F

(After the part “mirror” has been located)



- Select the part “mirror”
- Click “Symmetry” Under the toolbar “Assembly Features”
- Select “XZ plane” of the part “R8_door”
- Highlight “keep link with position”
- Highlight “keep link with geometry”
- File /Save all
- (A new part file “Symmetry of R8_mirror.CATpart” is created)





- (Name the assembly as R8_assembly.CATproduct)

- END -

For enquiries, please contact:

Dickson S.W. Sham
CATIA Certified Professional

Email : dicksham@sinaman.com
Website : http://www.dicksonsham.com
http://www.youtube.com/dicksham
http://www.youtube.com/dickshamold